THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXXV. No. 2123.] LONDON, JANUARY 19, 1904. [56TH YEAR. PRICE 6d.

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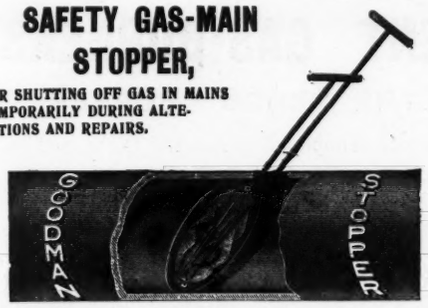

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PRICES AND PARTICULARS ON APPLICATION.

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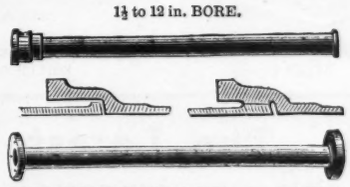

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Specially distil Carburine Spirit, specific gravity ·680, or of any other grade suitable for Enriching Gas; also Gas Oil best adapted for injecting into the Retorts, as in the Herring Process.

Importers of Petroleum for Carburetting Water Gas, or for Manufacturing Oil Gas. Distillers of Pentane, Petroleum Ether, and Naphtha for clearing the pipes of Naphthaline, &c.

Samples and Prices may be had on application.

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RETORT SCURFER

Saves its Cost many times each Year.

TESTIMONIAL.

WRITE FOR FULL PARTICULARS.

RESULTS GUARANTEED.

Gas Office, Longwood,
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GENTLEMEN,

We have now had your Retort Scurfer at these Works for over Twelve Months, and having tried several forms of de-scurfing Retorts, we have no hesitation in saying that it is by far the best Apparatus we have tried for this purpose. **Two men have several times drawn a Setting of Seven Retorts, thoroughly cleaned the same, and charged the Retorts again within 6½ hours.** As a matter of fact, it is unnecessary for a Retort to be out of use more than 40 minutes for scurfing purposes if your apparatus is used.

After being subjected to the blast of steam and air which is injected, the scurf is easily removed with a bar without violence and consequent damage to the Retort itself.

I am, yours faithfully,
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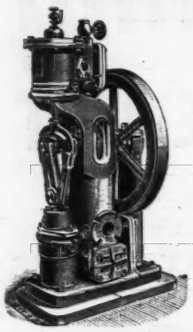

Fig. 705. "SINGLE RAM" STEAM-PUMP.

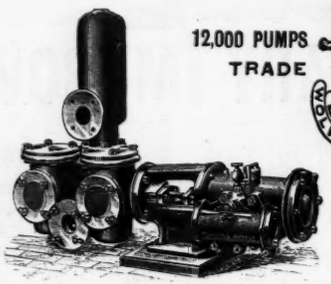

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

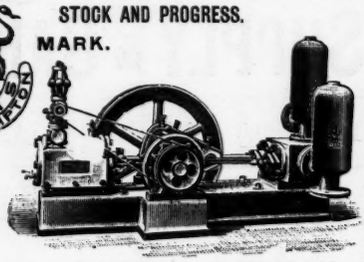

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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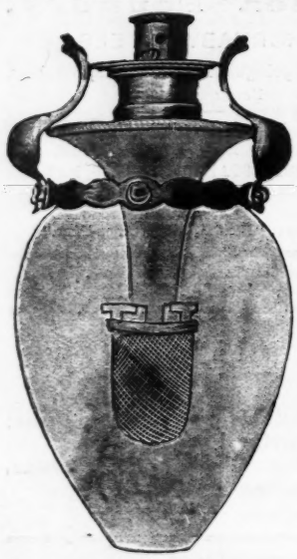

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Globes from **8d.** each.

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The most up-to-date and economical system of gas lighting, artistic in appearance and absolutely shadowless, and readily attached to existing fittings.

A BRILLIANT WHITE LIGHT OF 65 STANDARD CANDLE POWER.

Gas Consumption only 3 cubic feet per hour.

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Is the nearest approach to Electric Light, and lends itself more than any other gas-burner to private house lighting, having an exceedingly pretty effect when fixed in clusters of 2, 3, or 5 lights.

20 standard candle power.

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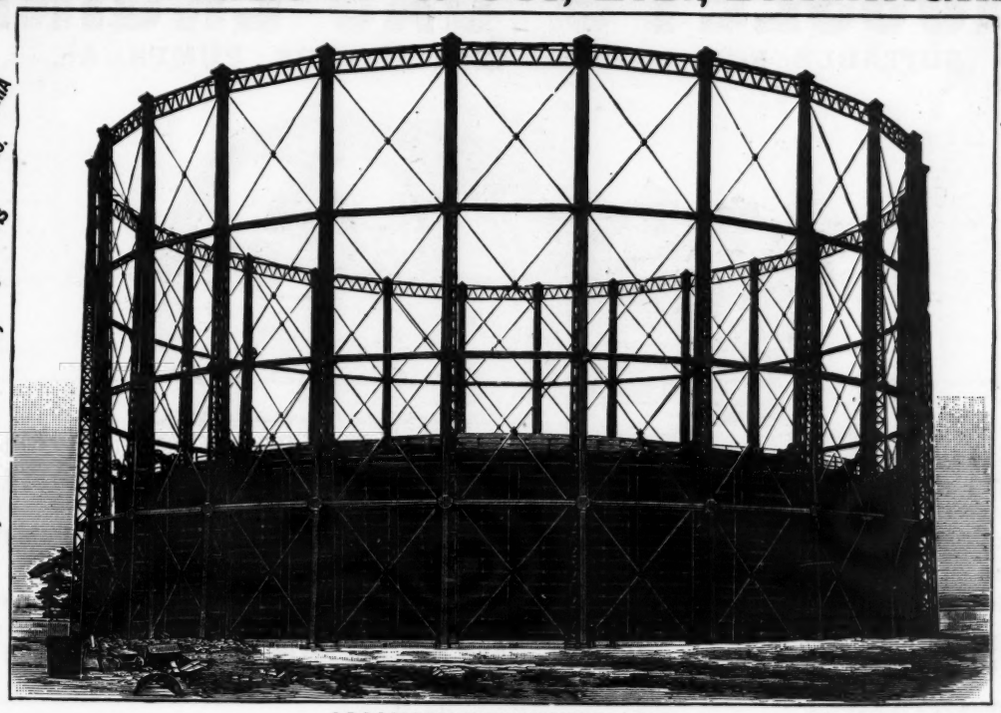

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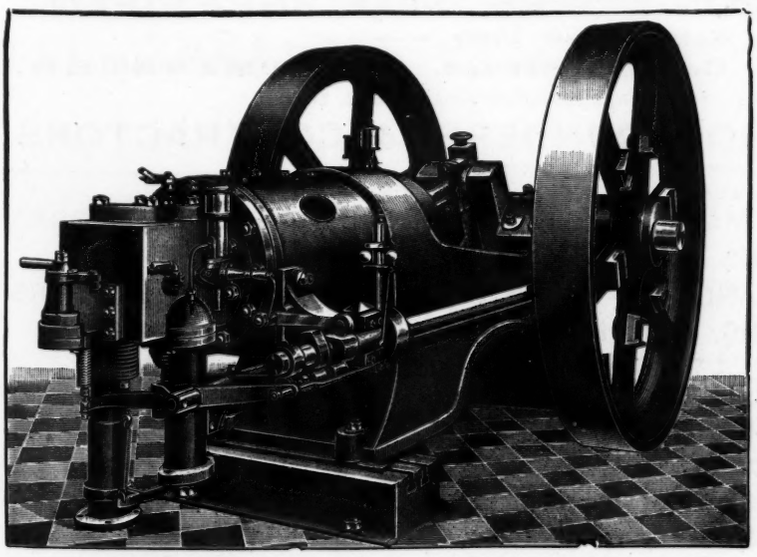

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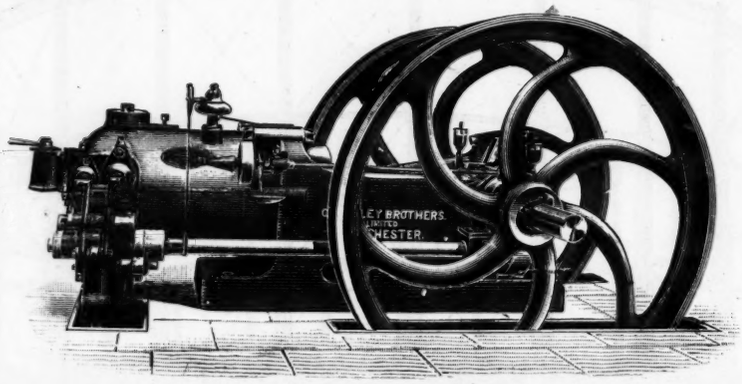

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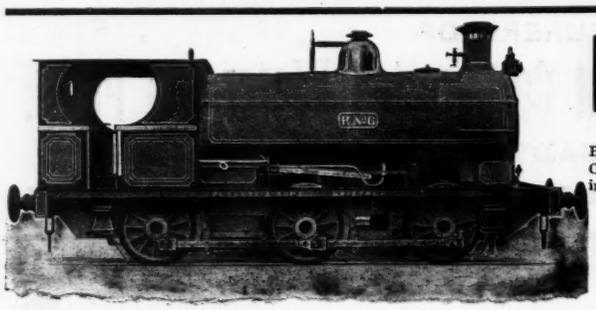

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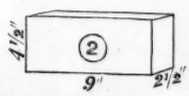

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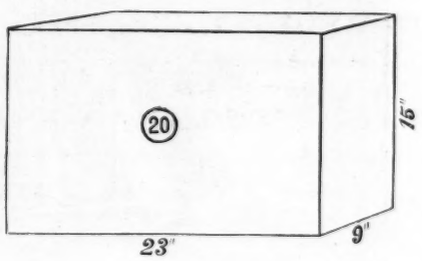

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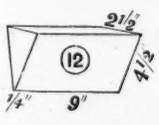

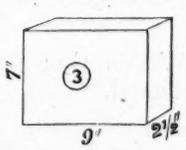

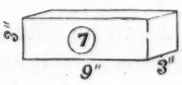

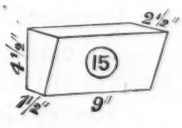

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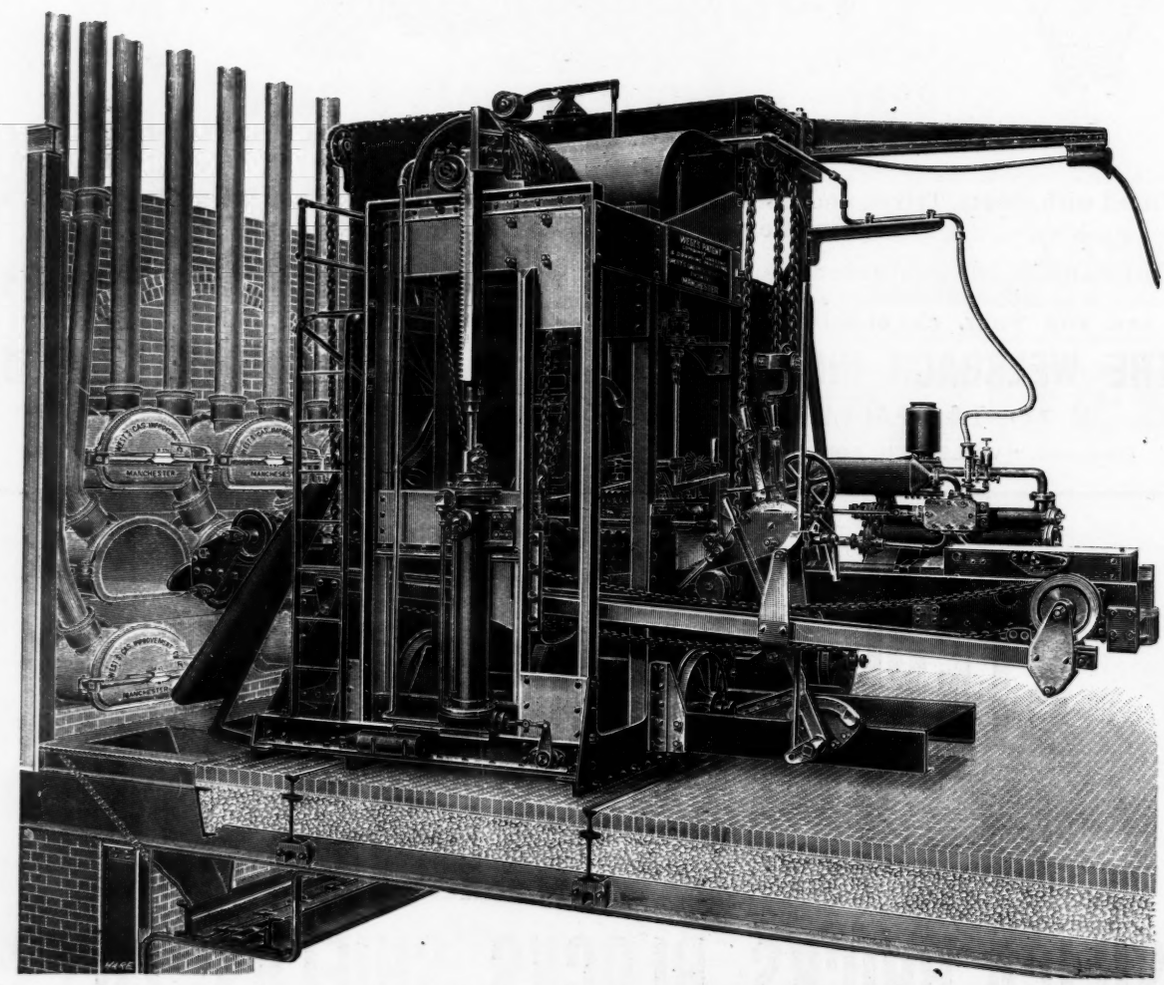

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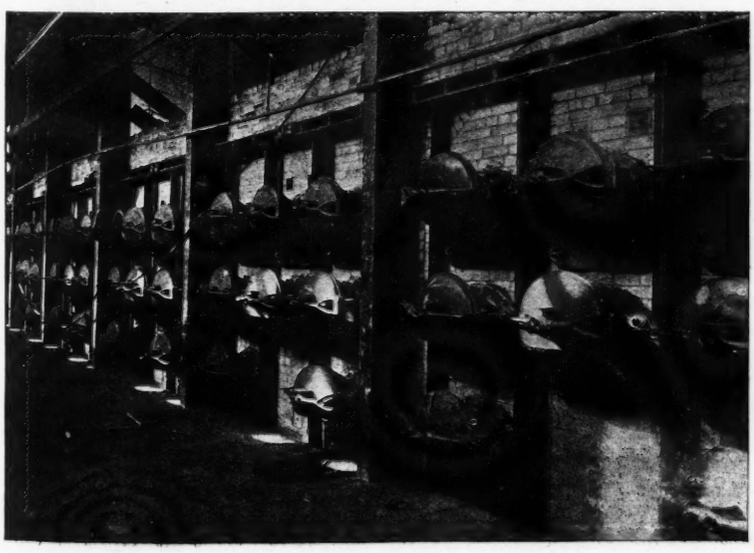

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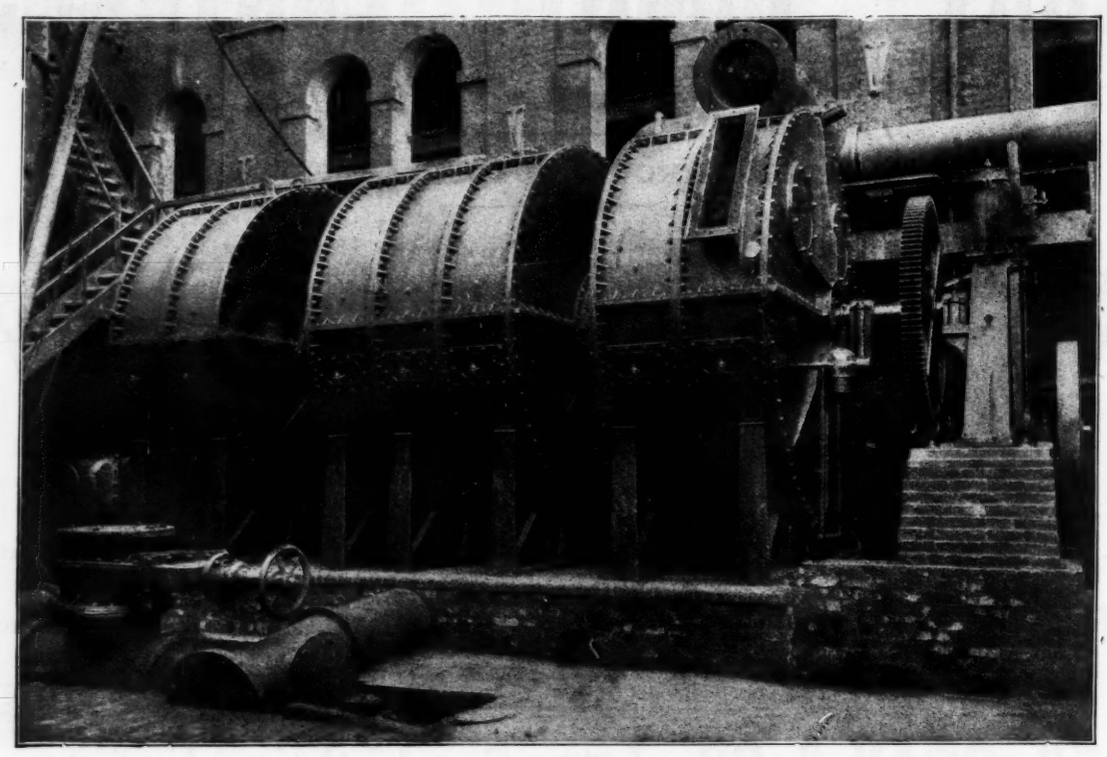

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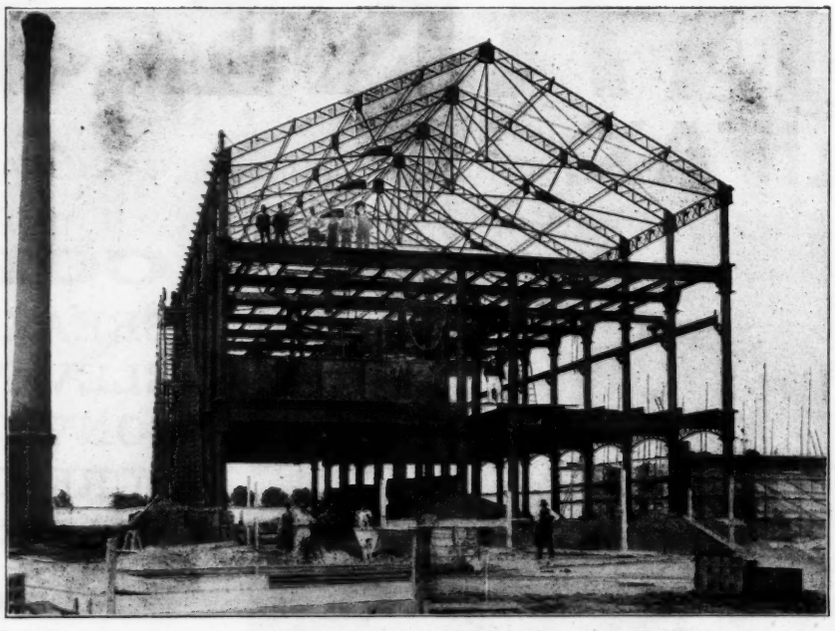

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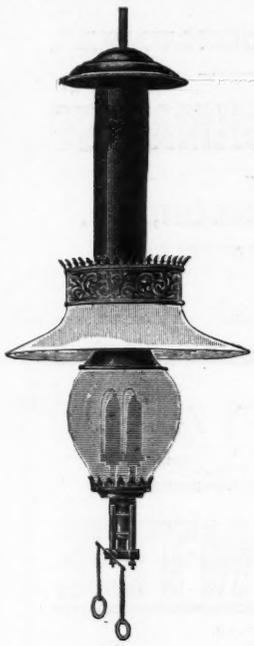

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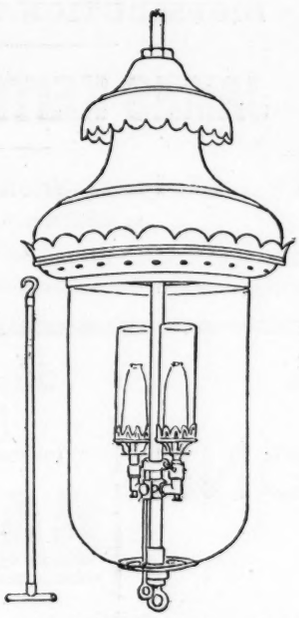

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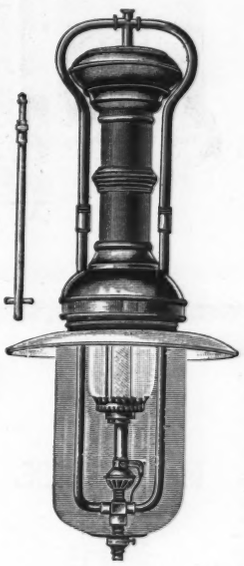

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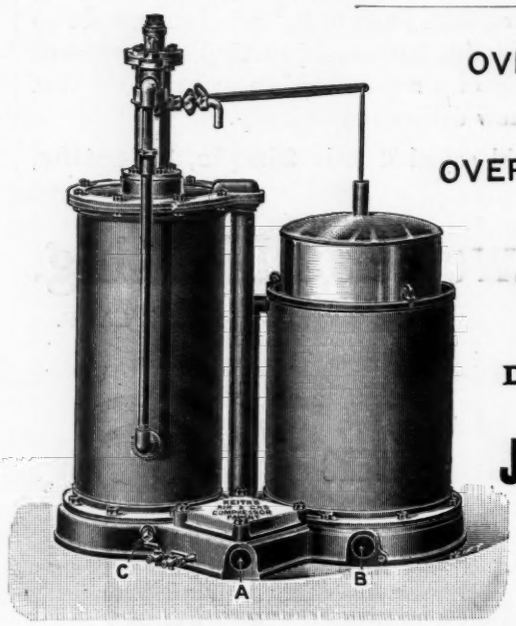

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BEST ENGLISH RAMIE.

In Ordinary Stitch and Double-Weave.

FOR ALL BURNERS IN USE.

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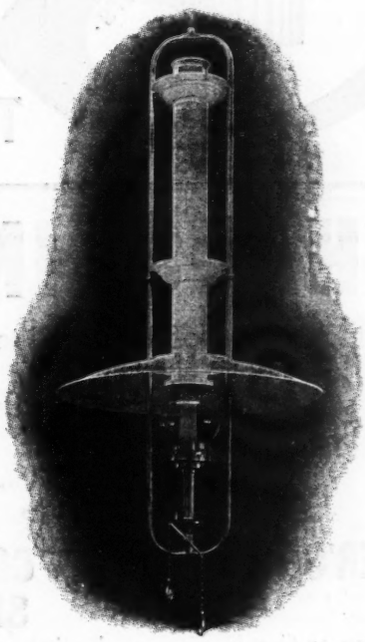

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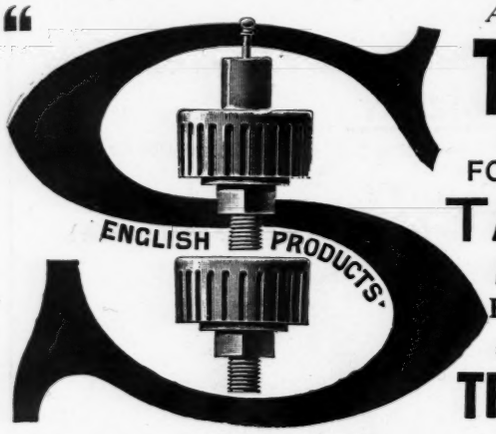

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CONTENTS.

EDITORIAL NOTES.

GAS, &C.—

Certain Corporations and the Trade in Gas-Fittings. 135
The Gas-Fire in Piccadilly 135
Why Profit-Sharing Does not Spread . . 136
Gas and the London Street Traffic Problem 136
Niggardliness in the Matter of Public Lighting—Plymouth: The Penny Wise and Pound Foolish—Crystal Palace Exhibition Awards—Electricity Nearly Half the Price of Gas—Troubles of a Non-Statutory Company—Making the Ratepayers Understand—Wayleaves and Licences . 137

WATER AFFAIRS—

The Rainfall of the Past Year 138

ESSAYS AND REVIEWS.

Gas and Water Stock Market 139
Electric Lighting Memoranda 139
Gas as a Fuel 140
Gas Bills for 1904 141
The Cheapest Power 142
Impermeable Cement Concrete. 142
The Didier-Stettiner System of Inclined Retorts in England 143
Presentation to Mr. Marshall 152

TECHNICAL RECORD.

Manchester and District Junior Gas Association—Visit to the Higginshaw Gas-Works . 153
Gas Power for Electric Central Stations . . 154
The Economic Value of Gas Coals. . . . 155

CORRESPONDENCE.

Use of Flueless Gas-Stoves 157

REGISTER OF PATENTS.

Patent Notices 157

LEGAL INTELLIGENCE.

A Sequel to the Arsenic in Beer Scare. . . 157
Banbridge Quarter Sessions—Downey and Downey *v.* The Banbridge Gas Company—Damages for Gas Poisoning 157
Claim for Damage to a Slot Meter and Fittings by Fire 158
Prepayment Meter Theft at Aldershot . . 158
Claim against Mr. J. E. Addicks 158
Responsibilities of Prepayment Meter Consumers 158

MISCELLANEOUS NEWS.

A Remarkable Gas Fire in Piccadilly . . . 159
Devonport Corporation Gas Undertaking . 159
Projected Gas-Works Extensions at Oldham. 160
Gas Purchase Question at Barnard Castle . 160
Public Lighting of Windsor—Electricity Adhered to 161
A Victory for Gas at Leamington—Electricity Superseded at the Winter Hall 161
Fatal Gas Explosion at Eastbourne . . . 162
Fatalities through Inhaling Gas. 162
The Electric Lighting Qustion at Dorchester 162
Hexham and the Electric Light 163
The Marylebone Electric Lighting Muddle—The Company's Suggestion Rejected . . 164
Uxbridge Water Supply—Suggested Improvements 165
Notes from Scotland 166

MISCELLANEOUS NEWS (*continued*)—

Current Sales of Gas Products 168
Coal Trade Reports 169
Stock and Share List 171

PARAGRAPHS.

Opposition to Private Bills 152
Obituary 153
Masonic—Institution of Civil Engineers—Lowe Crude Oil Water Gas—Trade Disputes Last Year—Cost of Electric Light for a Large Office Building in New York . . . 153
A Large Spanish Water Scheme—Wellington Gas Bill—Boston (Mass.) Water Supply—Proposed Government Control of Water Supplies—District Councils and Water-Rents 156
Gas and Electricity at Burton-on-Trent—Electricity Not as Good as Gas—Power Users and the Price of Gas at Driffield—Bradford Gas Fund and the Cartwright Exhibition 158
The Proposed Water Supply for the Torpoint District 160
Slot-Cookers for Liverpool—Gas Unharmed by Electricity at Elland 161
Reduction in Price at Crewe—Explosion at the Oldham Gas-Works—Gas Consumers' Complaints at Weston-super-Mare—Jubilee of the Gas Supply of Rome 169
St. Helens Gas and Water Supply—Rickmansworth Gas Arbitration—Charge for Delivering Coke at Rochdale—Manchester Gas Workers and their Wages—Improved Public Lighting for Sandwich—Opposition to the Bognor Gas Order 170

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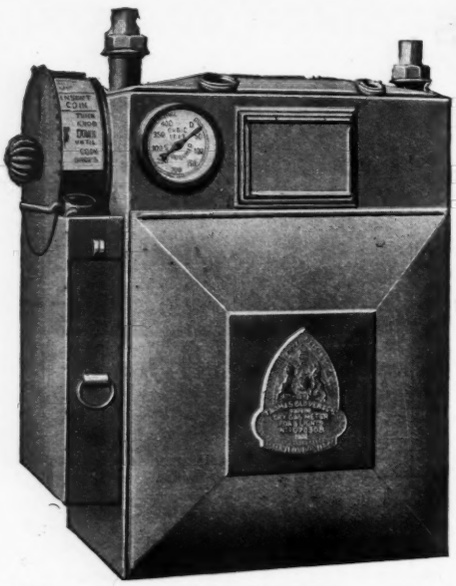

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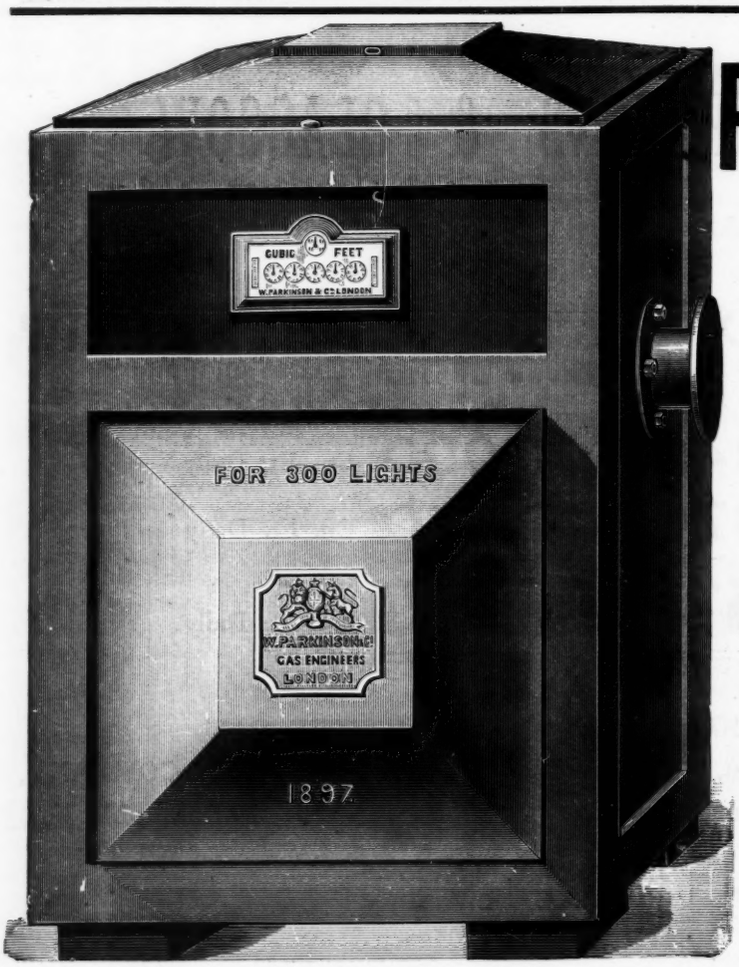

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VOL. LXXXV., No. 2123.—TUESDAY, JANUARY 19, 1904.

EDITORIAL NOTES—GAS, &c.

Certain Corporations and the Trade in Gas-Fittings.

AN interesting example of the reaction that appears to be growing in strength, as well as spreading, against municipal trading in gas-fittings, is furnished by certain proceedings at Southport. The associated ironmongers and plumbers of this flourishing town seem to have made up their minds that they will not sit still and watch the Corporation "taking the bread "out of their mouths." Accordingly, they have asserted themselves so effectually against the policy of the Gas Committee, that the question of the future conduct of the Corporation show-room for gas stoves and fires is down for consideration at the next Town Council meeting. At Southport, the issue is made more clear, and at the same time rendered more difficult of solution in a way satisfactory to all parties, by the special circumstance of the Corporation having given an assurance that there was no intention to conduct any sales at the show-room. All orders received for stoves and fires were, it is stated, to be executed through the local ironmongers and plumbers. Despite this assurance, it is reported that sales were effected at the show-room; whereupon the injured tradesmen made representations to the Gas Committee which resulted in a further offer by the latter, to the effect that the Committee would hand over to the trade the lion's share of the profits on sales. It does not appear how so artificial a partition was to be worked; but this is a question of small importance, in view of the fact that the associated trades would have none of it. A deputation of ironmongers and plumbers waited on the Gas Committee, to complain of what they considered to have been a breach of faith; and when one of this body—a local draper—ventured to lecture the deputation on their selfishness, he was asked how he would like the Corporation to open a shop next to his for the sale of dresses on the hire system. The retort serves to illustrate the lines upon which the principle of municipal trading is being contested nowadays. As we have always contended, the idea of municipal trading in the abstract is one thing, and particular competition by a Municipality with its ratepayers is another. It is the particular application only that pinches.

This subject is constantly cropping up for discussion when gas managers meet together—as lately in the case of the Manchester District Institution—and by local authorities. It is a matter of historical fact, as we have repeatedly shown, that the gas industry in general is not indebted at all to any enterprise of ironmongers or plumbers for the enormous modern development of the popular use of gas stoves, fires, or the incandescent gas-light. Not to go back beyond the history of the last-mentioned application of gas, it is sufficiently notorious how "the trade" proved to be a broken reed indeed to the original Welsbach Company, when they trusted it in preference to gas companies. As with really serviceable gas cooking-stoves and fires, so once more with the incandescent gas-burner, the business had to wait for the gas companies to put it upon a sound basis. There was, in short, no trade worth speaking of in these commodities, until the gas companies made it by the help of their capital and enterprise. It is therefore idle for ironmongers and plumbers to complain generally that they have suffered on this account. Yet here again the "general" has no existence. It is not the abstract ironmonger or the hypothetical plumber who protests; but the tradesman, shopkeeper, and ratepayer, of Southport or somewhere else, who objects to the local government competing with him in his business. We know what Parliament has done already, at the suggestion of the Board of Trade, in preventing the unlimited extension of this municipal shopkeeping. Local authorities are always forbidden to manufacture gas accessories; and the prohibition is, rather illogically, extended to gas companies. It is scarcely overstating the principle imperfectly embodied in this restriction, which was only meant for a stop-gap, to put it as meaning that municipal gas undertakings should rather prescribe and encourage the choice of good articles than go out of their way to deal in them. The Board of Trade avowed, through Sir Courtenay Boyle, that they looked with considerable apprehension and disfavour upon the stocking of fancy goods by local authorities, but admitted the difficulty of drawing the line.

The only safe conclusion to draw in this regard is that the matter is one for local treatment, according to local circumstances. If ironmongers and plumbers have been backward and unenterprising, so have many gas undertakings; and it is rather a "large order" to hold that local authorities who have hitherto done nothing in gas-fitting should be allowed to suddenly launch out into branches of trade in which certain of their ratepayers make their living. Whether or not the same objection applies to drapery or to tailoring, it certainly does to municipal electric light wiring. Circumstances alter cases, and must indicate the treatment to be applied to particular examples by the rule of "live and "let live." The practice in one locality is not necessarily suitable for another. Places where the gas-fitting always has been done by the Gas Company, and is carried on by their successors the Local Authority, are no guides for others where a respectable independent trade in gas-fittings has been allowed to establish itself and flourish.

The Gas-Fire in Piccadilly.

NOT since the lamentable catastrophe in the Tottenham Court Road in 1880 has there been an accident in the extensive and complicated gas distribution system of London so critical as that which happened last Wednesday morning in Piccadilly, nor one which has called for so much energy and circumspection to avoid sorrowful consequences to the public and destruction of valuable property. The causes and effects of the accident, and the steps taken to deal with the emergency in order to avert the threatened dangers, to suppress the great conflagration, and to simultaneously maintain a constant supply of gas to the consumers in the large and wealthy surrounding district, are traced in the special account of the occurrence in our news columns. To the particulars there given, no addition is required here, nor need they be repeated.

As a spectacle, the fire was magnificent; as a centre of extreme peril, the memories of many years have to be searched to find anything, even on a smaller scale, which can be described as a parallel. The Tottenham Court Road disaster had no resemblance in the causes and, thankful are all concerned to say, in the results. Last Wednesday's accident, however, was one which demanded the exercise of skill and caution of the highest degree. Here were three mains—an 18-inch, 6-inch, and 4-inch—eructating gas from their far separated ends, and which gas had fired from one of two causes. The immense volume of flame almost filled a gaping pit, and rose some 20 to 30 feet in the air, with small clouds of escaping gas floating away and firing at a distance up. While the gas was burning, there was really only danger from the segregated flames and from the intense heat. The greater danger lay in the choice and the execution of the methods by which the large flow of gas was stopped and the huge flames extinguished. Gas engineers and those conversant with the intricacies of gas supply in such an area as this, and who alone are in a position to appreciate the situation, will agree that the course adopted by Mr. G. F. L. Foulger, the Distributing Engineer of the Gaslight and Coke Company, was the only safe one, for the protection of the public, neighbouring property, and an important part of the Company's distribution system. But that is not the way of thinking of several irresponsible and (in these matters) uninformed critics in the public Press, who have tried to fasten on to the Engineer answerable to the public and to the Company the ignominy of not using sufficient despatch, and not adopting the quickest and most effective course of procedure to allay fear and suppress the fire.

One writer makes the mad suggestion that the supply of gas to the district should have been shut down at the works, little knowing what the adoption of his proposition would

have meant in the way of creating an explosive mixture in the gas distribution system of the most important area of London, and of the possible and probable sacrifice of life, limb, and property that would have ensued—to say nothing of the peril and inconvenience within the houses of the consumers. The general public have no knowledge—it can hardly be expected that they should have such knowledge—of the danger attaching to the sudden tight closing of a valve controlling even a short length of large gas-main with an open end at which there is flame. To have adopted the proposition referred to would have, in all likelihood, produced a disaster in front of which that of Tottenham Court Road would have faded into insignificance. There was, in the circumstances, even by the methods adopted by Mr. Foulger, a restricted amount of danger from the formation of an explosive mixture in the lengths of the 18-inch main between the flaming outlets and the points where, after considerable difficulty and laborious work, he succeeded, with the hearty co-operation of the staff he had on the spot, in inserting gas-bags; but, fortunately, his course of action, as described elsewhere, was completely successful.

The Editor of the "Daily Graphic" comments on the occurrence under the supposition that "half-a-dozen cart-loads of "sand" would have smothered the flame. What profound wisdom! Here was a great yawning gulf between the ends of the pipes—80 feet at least of open space separating them, and the bottom of the gulf a considerable depth below the projecting ends. Where would the half-a-dozen cart-loads of sand have been? Nonsense of this kind is not worth argument. But the unfortunate thing is that such absurdity is calculated to create false impressions in the public mind, which is ever receptive to fault-finding concerning officials of public undertakings; and, frequently, as in this instance, a grievous injustice is done. To contemplate the possible consequences, if theorists such as those we have referred to had been allowed to put their ideas into practice last Wednesday, is enough to make one reel. The reckoning of the disaster would, in all probability have included some who are now in the land of the living. As it is, the public has suffered nothing greater than an interruption of traffic, thanks to care and watchfulness, and the exercise of the patience necessary for coping with unpliable difficulties in a position that would have disconcerted many men.

Why Profit-Sharing Does not Spread.

It is greatly to be hoped that the present year will not be permitted to run its course without the addition of some more gas undertakings to the very limited number of those that have followed Sir George Livesey's lead in introducing profit-sharing, with shareholding. When one contrasts the quickness with which gas directors take to any new advantage of a financial or a mercantile character—such as stock consolidation or conversion, the reduction of illuminating power, and so forth—with their neglect of a good precedent in the matter in point, it is impossible to resist the reflection that the things of this life are not equally measured out. Why do the one, and leave the other undone? Our contemporary the "Ironmonger" perhaps represents the feeling which induces the ordinary gas director to pass over this question, by ascribing all the success of Sir George Livesey's schemes of the kind to the "personal factor." Doubtless, every proceeding of this character answers best when carried out by those who believe in it. But this is no reason for leaving everything of the kind alone. Why cannot the belief spread farther afield, as it has already begun to do? It seems very remarkable that this should be almost the only one of Sir George Livesey's innovations on the routine of gas manufacture that hangs fire.

Our contemporary goes on to remark generally that "the "weak spot in the system is the unwillingness of the work-"people to share losses as well as profits; and until a more "general disposition to participate in adversity as well as "in prosperity is manifested, it is to be feared that the idea "will not come generally into favour." This is precisely the sort of explanation that would be pounced upon as an adequate excuse for doing nothing, by those who were already so disposed. It is a purely *a priori* contention, with no foundation in fact. The truth is, that the "willingness" or unwillingness of workpeople to do anything is not manifested because their consent is not asked. It is always the employer who starts the experiment, unasked; and when he is dissatisfied with the result, he stops it, also unasked. Where, then, does the element of willingness of the workpeople come in? Nowhere. Their "disposition" is and remains an unknown quantity. It is the disposition of the employer that counts; and this is an attribute of mastership which carries with it a responsibility. This particular responsibility is merged in the far greater one, which the employer bears in common with all full citizens of the freest Commonwealth on earth, and agents of a Power which works ceaselessly towards an end hidden from sight—the responsibility for conforming to his best insight. This is really the last word that can be uttered on the subject of individual responsibility.

As regards the hindrances and the difficulties that have arisen in the way of profit-sharing, and have led to the abandonment of the practice in various instances, not one is of the nature of that indicated above. They were either systematic or personal defects or shortcomings, due in general to over-expectation, imperfect preparation, sheer faint-heartedness, or perhaps to a misunderstanding of the whole thing on all sides. People who doubt the efficacy of the principle, when it is properly applied, had better consult those who are in the best position for being able to remove such doubts, because they know. Meanwhile, the general situation is that there is this knowledge to be had by those in whom the initiative reposes. As their power and knowledge, so is their responsibility in the scheme of things.

Gas and the London Street Traffic Problem.

The London Traffic Commission continues to collect evidence more or less pertinent to the questions submitted to it; but a great many of the views laid before it are visionary. The particular problem of the possible construction and use of subways has been broached in several forms, but not, as a rule, with much regard for practical considerations. It is interesting to note that the amateurs of street subways have greatly modified their ideas respecting this class of public service works. At one time, the subway was only regarded as the sovereign remedy for the breaking up of streets in order to get at mains, services, and wires. The suggestion usually made in this connection was that the gas and water companies, and the owners of wires and cables, should pay for the hire of these supposed conveniences, and thus defray the cost of their construction. Now, however, the subway enthusiast has larger views. He has heard about "shallow "subways" under the streets for tramways as well as pipes; and the phrase has so "caught on" with certain talkative municipal persons, that it has been frequently mentioned before the Commission. It has been left for an engineer of standing and experience—Sir Douglas Fox—to pour the requisite quantity of cold water upon this fancy. He told the Commission that the cost of so-called shallow subways under old thoroughfares would be prohibitive, even if they were feasible, which is very doubtful indeed in the case of Central London, built as it is on made-ground and water-bearing gravel. Naturally, the amateurs of the London County Council who have taken up the idea from the example of New York, which is built on rock, never thought of this difference. Even so, the construction of these works in New York, which was sprung upon the people, has caused an amount of interference with street traffic and the amenities of frontagers which is without parallel, and is not likely to be permitted again.

Alderman Sir Henry Knight told the Commission that, in his opinion, the use of coals in London should be interdicted, and gas substituted for cooking and heating purposes. This would relieve the town of fog, and at the same time take a great deal of dirty traffic out of the streets. As a matter of course, so sweeping a recommendation was received with much misgiving by the Commissioners, who offered remarks to show their preference for a fire that could be poked. This is what might be expected; but, in all probability, what Sir H. Knight meant to impress upon the Commission was the fact that gas cooking and heating are specially applicable to the needs of the City. So far as the cooking is concerned, the campaign against smoky chimneys, which is now extended to hotel, restaurant, and club-house chimneys, is having its due effect. It will be the default of the Gas Companies if they do not turn this development to the best advantage. It has already been recorded how effectual the slot meter has proved itself in superseding the retail traffic in house coal in the small streets; and it is not too much to expect that in good time natural causes will go far to bring about Sir Henry's ideal of the practical elimination of the coal-van from the principal thoroughfares.

Niggardliness in the Matter of Public Lighting.

Those who visit many cities and towns in this and other countries must occasionally have the train of their thoughts directed to the wide diversity that exists in—assuming the illustrations to represent them—the estimates of local authorities as to what is a sufficiency in the matter of public lighting. Few are really liberal, some adopt a middle course, and others are positively niggardly—excepting where electric arc lighting is concerned, and then, in most cases, the authorities at the commencement are absolutely thriftless. It would be of extreme interest to be able to look under the surface, and see what are the strange workings of the municipal mind that cause them to be parsimonious in the illumination of their streets in these days of the incandescent gas mantle. The lighting of the streets, and in the best manner possible without waste, is one of the legitimate and needful functions of local authorities; but it has, in some instances, come under the baneful influence of the modern canon of municipalism to save as much as possible on the old and spend lavishly on the new. It has been noticed lately how in several cases incandescent gas lighting has come to the aid of such authorities in observing this latter-day rule. They have had urged upon them with persistent frequency that the incandescent burner saves gas, that there cannot be wasteful consumption with it or the mantle will not give its best illuminating effect, and that a much higher illumination for the streets can be obtained, by its means and through the saving in gas consumption, at about the old cost. But wily municipal councillors who are actuated by the new canon see in the incandescent burner something else. They recognize in it an economizer—a means to an end; and the end is the saving of money to spend on other purposes. It is such councillors as these who influence their colleagues to adopt incandescent gas-burners, not as improvers of the lighting of the streets, but to secure—this is where their craft comes in—some where about the old illumination at about half or less than half the old consumption of gas, instead of treating the incandescent system as a means of greatly increasing the illumination of the public ways at about the same cost as formerly. Of course, electrical enmity may also be at the bottom of this foolishness.

Plymouth—The Penny Wise and Pound Foolish.

The municipalities of the type of those referred to in the preceding paragraph are, thank goodness, of the minority; but that such a condition of things exists at all must be a matter of regret to advocates of public lighting improvement. We do not know to what exactly to attribute it—whether to a desire to save money at the expense of the betterment of their streets at night-time (and they lamentably stand in need of it), or to the fact that the Corporation are suppliers of electricity, and are unfriendly inclined towards the particularly acute defensive weapon which the Gas Company hold in the incandescent gas-light. But the fact remains that the conversion of the greater part of the street lighting at Plymouth from flat-flame burners to incandescent burners, where electric arc lamps have not been applied, is a disgrace to any self-respecting municipality. That was the verdict one could not avoid arriving at after a walk through the streets of Plymouth a few nights since, when there for the purpose of obtaining the material for another article appearing in this issue. On inquiry, it was learnt that, when the Corporation first turned their attention to incandescent gas lighting, they fitted up the lamps of a couple of streets with No. 4 Kern burners; and the result was very satisfactory. So satisfactory, in fact, that the proposal was made in the Council that the public lamps, of which there are about 2400 (excepting in the main thoroughfares, lighted by some 57 electric arcs, and in the two streets supplied with No. 4 Kerns), should be fitted with No. 2 burners, consuming only 2½ cubic feet each per hour. The Chairman of the Gas Company (Mr. J. A. Bellamy) is a distinguished member of the Corporation; and when the proposal was made to substitute only No. 2 Kerns for the old flat-flame burners (which consumed perhaps 5 or 6 cubic feet), he essayed to tender his colleagues some good advice, but was rewarded by being completely howled down as an interested party. When it is remembered that the gas consumption for public lighting then averaged only 4½ per cent. of the output, and that the Corporation were being allowed 5 per cent. discount on 1s. 9d. per 1000 cubic feet, it will be recognized that the Company's interest in the matter was not of a momentous character. The curious thing is that Alderman Radford was one of the strongest believers in No. 2 Kerns being all-sufficient for public lighting. The Alderman is the Chairman of the Corporation Electric Lighting Committee; and thereby, perhaps, hangs a tale. If Alderman Radford were consistent, he would now advocate the substitution of the expensive electric arc lamps by (say) 8-candle power incandescent electric lights. However, the change having been effected from flat-flame to No. 2 Kerns, what have the Plymouth Corporation achieved? Notwithstanding the additions made to the street-lamps since the alteration of the burners, the consumption of gas last year for public lighting was only 27½ millions, as against 40 millions in 1899. They have saved 12½ million cubic feet of gas, a large part of which would still have been saved had they adopted No. 4 Kerns. The Gas Company would have benefited but little, remembering the price of gas and the discount, while the public would have gained considerably in the lighting of their streets. But the Plymouth Corporation have achieved something else, and that is the distinction of being, in the greater part of their area, one of the worst lighted among towns of equal size in the country—notwithstanding the adoption of incandescent gas lighting. In regard to public lighting, and some authorities think in other matters too, the Corporation have proved their capability of being "penny wise and pound foolish."

Crystal Palace Exhibition Awards.

The Crystal Palace Company have, so far as they were able under the changed circumstances between the issue of the prospectus for the Gas Exhibition and the opening of the latter, faithfully carried out the conditions and terms. One of these was the awarding of medals by a competent Jury. There has been a considerable amount of sympathy in the gas industry with the Crystal Palace Company over the vacillation that ended practically in the destruction of the exhibition; and it will afford no little gratification to many members of the Institution to learn that the Company secured the good and capable offices of Mr. Charles Hunt, Mr. H. Leicester Greville (until lately Chemist to the Commercial Gas Company), and Mr. B. H. Thwaites as the Jury; the first-named gentleman acting also as Chairman. The result of their adjudication was as follows: The James Keith and Blackman Company, Limited, gold medal; the Davis Gas-Stove Company, Limited, silver medal, and highly commended for their steam cooker and flexible enamel; Moffat's, Limited (Lucas gas-lamp for internal illumination), gold medal; the Plaissetty Mantle Syndicate, Limited, gold medal; the Flavel Range and Imperial Gas-Stove Company, Limited, gold medal; Mr. G. W. Cuddon, honorary mention for gas-stoves; Mr. George Wilson, gold medal for gas-meters; Herr Richard d'Heureuse, silver medal for woven incandescent mantles. In regard to the Millennium light, the Syndicate were not exhibiting, but merely lighting the stand of the Imperial Gas-Stove Company; and, therefore, the Jury could not make an award, but they expressed themselves as highly pleased with the display made. The exhibition closed on Saturday.

Electricity Nearly Half the Price of Gas!

The unique distinction has been acquired by Mr. Cyril M. Shaw, the Electrical Engineer to the Wakefield Corporation, of proving (to his own satisfaction) that the electric light, comparing light with light, is nearly half the price of any other illuminant, and not ten times as dear, "as some irresponsible and interested persons have stated." Mr. Shaw, of course, is not an "interested person"—it is only to his opponents that this term can be applied. Doubtless our readers will be as curious as ourselves to learn by precisely what means he has arrived at his novel conclusion; but we are sorry not to be able to enlighten them, as the newspaper report of the lecture in which he made the announcement does not seem to be so clear as might have been the case. Mr. Shaw, however, says he can substantiate his contention; and it is to be hoped he will be good enough to do so. But until he does, we must be content to be numbered among the "irresponsible" ones who are satisfied to be guided by the general experience (of which there is no lack) on the matter. What the general experience is, readers of the "JOURNAL" do not need to be told; but in this connection reference may be made to a discussion (reported on another page) which has just taken place in the Leamington Town Council. The comparison adopted is the same—namely, that of electric arc lights with Lucas incandescent

gas-lamps—but with one important difference. In Leamington, the electric current is supplied by a Company at, presumably, the cheapest rate at which they find it profitable to furnish it; whereas at Wakefield the arc lamps are the property of the Corporation. Is the price at which the latter are supplied—we will not say a profitable one, but sufficient to cover all charges, including interest, sinking fund, and depreciation? This, it seems to us, is the point on which further information is necessary before Mr. Shaw's statement can be accepted as applying to Wakefield—for it certainly cannot apply elsewhere, or there would not be the continuous growth of incandescent gas lighting, and frequent supersession of electricity, which is being witnessed. Mr. Shaw, for the purposes of his calculation, takes gas at 2s. 6d. per 1000 cubic feet, and electricity at 1·13d. per unit. It is with regard to the latter figure that some enlightenment would be welcome. With the examples of Liverpool, Manchester, and many other Corporations who own electric lighting undertakings, before us, Mr. Shaw will doubtless pardon our scepticism.

Troubles of a Non-Statutory Company.

From time to time matters crop up which show how unsatisfactory may be the position of a non-statutory gas or water company should the local authority who possess jurisdiction over the roads in which the mains are laid, or require to be laid, choose to make themselves disagreeable. Of course, in the great majority of instances, public bodies are fully alive to the fact that it is for the good of the community, as well as for the benefit of the shareholders, that operations are carried on by such companies; and that, by placing obstacles in the way of the supply of gas and water, they are acting against the interests of the inhabitants as well as in antagonism to those of the undertakings concerned. Now and then, however, a local authority are found who, from some cause or another, appear to take a somewhat perverse view of their duties in this respect; and the result is a dispute which generally results in litigation—to the benefit of neither party. A case in point occurred twelve months ago at Barnard Castle, in which the Company, after having been allowed for nearly seventy years to lay their mains in the public streets without hindrance, suddenly found difficulties placed in their way by the Urban District Council, and in the end were fined a shilling, under section 149 of the Public Health Act of 1875, for breaking up the streets without permission. In commenting on this action at the time it took place, we remarked that the remedy for such a state of affairs was usually in the hands of the companies themselves, who might, by obtaining statutory powers, secure a position which would enable them to snap their fingers at the local authorities who tried to make things unpleasant for them. It was pointed out that, so long as they did not do this, they were, of course, more or less at the mercy of the whims of councillors who, after allowing things to go on pleasantly for ever so many years, might suddenly develop a tendency to make them as uncomfortable as possible for the company. The course we then recommended is the one that the Barnard Castle Gas Company have since decided to adopt; and their only regret now must be that they did not take the step before they became involved in the dispute with the Council.

Making the Ratepayers Understand.

This decision on the part of the Company, however, was not passed by unnoticed by the Council, who promptly resolved to promote a Bill for the compulsory purchase of the gas undertaking. There was thus the prospect of a very pretty little fight in Parliament; but unfortunately for them, it has since transpired that the Council had reckoned without the ratepayers, for at the public meeting which is required to be held the proposal of the Council has been emphatically rejected, and no steps have since been taken for a poll of the citizens on the subject. From this it may be inferred that it is not the townspeople generally who are opposed to the Company and all their ways, but merely a section of the Council. That, however, is a phase of the question which is of purely local importance. Our object in referring to it here is to call attention to the effective method adopted by the Company for placing the townspeople in full possession of their side of the case. At such times as this, it is often difficult—sometimes extremely so—for the company concerned to make all the facts known; and the means taken by the Barnard Castle Gas Company to this end may possibly commend themselves to others finding themselves in a like position. In the form of 44 questions by the ratepayers and answers by the Company, set out in parallel columns on foolscap sheets, for distribution among the inhabitants, the whole history of the dispute with the Council is clearly set forth, along with the financial position of the Company, and an indication of the probable effect on the rates that would be caused by the compulsory purchase of the gas-works. An apt quotation from "The Times" articles on "Municipal Socialism" is also included in the document.

Wayleaves and Licences.

From the outline of the questions and answers which appears in another part of to-day's issue, it will be seen that the Barnard Castle Gas Company have no wish whatever to deny that the roads are under the control of the Council. What they did object to was a proposal that they should pay a licence for opening up the streets, as well as a wayleave for existing mains. The licence was fixed by the Council at 6d. per yard, and the wayleave at £5 per annum. But while these figures were not by any means exorbitant, they involved the sacrifice of a principle. Their imposition has therefore been resisted by the Company, who have, however, stated their willingness to pay amply for repairs, which the Council had undertaken to do themselves, on the plea that the Company were not in the habit of properly making the roads good again after having broken them up. It is stated that, when challenged, the Council's advisers were unable to produce any authority for making the proposed charges for licence and wayleave, and that they have since dropped them. It will, however, be noticed that at the meeting of the Company last week the Clerk intimated that he was at last able to produce authority for the imposition of a charge for wayleave. What the nature of the authority is, we do not know; nor does it seem now to be a matter of great importance to the Company. The Barnard Castle Urban District Council have succeeded most admirably in demonstrating the advisability of gas undertakings securing statutory powers. The Company in their own area have not been slow to take the lesson to heart; and perhaps it may also induce others to place themselves in an unassailable position before, rather than after, trouble comes upon them.

WATER AFFAIRS.

The Rainfall of the Past Year.

THE recent publication in "The Times," by Dr. H. R. Mill, of some statistics concerning the rainfall of the past year—preliminary to the issue, a few months hence, of a volume entitled "British Rainfall, 1903," dealing much more fully with the subject—justifies further reference to a topic which, although it has lately been discussed *ad nauseam*, should always possess interest for the purveyors of water. For, whether they derive their supplies from water flowing upon the earth or from that which lies beneath its surface, unless their sources are replenished, they will necessarily experience difficulty in meeting the requirements of the consumers; and that replenishment must descend from the skies in the form of rain. Last year, it must be confessed, it came down almost too abundantly. According to the figures presented by Dr. Mill (who, owing to the retirement, after more than thirty years of devoted labour, of Mr. Sowerby Wallis, bears the whole burden of the work originated and carried on by the late Mr. G. J. Symons), at least one of the conditions depicted in the weird "rime" which the Ancient Mariner forced upon the unwilling ear of the Wedding Guest was fulfilled—there was "water, "water everywhere." He has tabulated the annual totals observed at 62 places selected to represent all parts of the British Isles with as much impartiality as possible, subject to the limitation of using only stations with averages of thirty years; and in every instance the fall was in excess of the average. The excess varies from 43·57 inches at Glenquoich, in Inverness-shire, to 1·5 inches, at Kibworth Beauchamp, in Leicestershire.

Dr. Mill tells us that when the percentage excesses are put upon a map, it is shown clearly that there were three very wet areas of considerable extent, in each of which the

year's fall exceeded the average by at least one-third. The first and largest of these areas occupied the South of England, from about Swanage to near Brighton, running northward to include the basin of the Thames, and extending beyond it northward from London; the second occupied North Wales and the west of Cheshire and Lancashire; and the third (imperfectly defined) lay north of the Caledonian Canal. As far as the Metropolis is concerned, the rainfall last year was greater by at least 3 inches than in any other year for which records exist; the high figure of 38·10 inches having been reached at Camden Square, compared with 35·10 inches at one station in 1852. On an average of thirty years, the increase was 12·94 inches. In an interesting little table giving the rainfall over the London district—an area lying within a radius of six miles from Charing Cross—some striking variations are shown. At Kensington, the figure is 42·37 inches—the highest in the table; while the lowest is 32·29 inches, at East Ham. At Leyton, as Mr. C. E. Jones showed in the "JOURNAL" a fortnight ago, the fall was 36·27 inches. Dr. Mill thinks that local conditions affecting the various gauges may possibly account for the divergence of the extremes; but as the average of 23 Metropolitan gauges is practically 37 inches, he considers this figure may be accepted as representing the rainfall for London during last year. If the variation from the average at Camden Square is applicable to London generally, the Metropolis received in 1903 "the average volume of rain "and half as much again." Beyond the Metropolis, in the Thames Valley, a perfect deluge fell in June; but it was a local phenomenon which affected only the southern parts of England.

Though the past year was so disagreeably wet, Dr. Mill assures us that, when regarded in the light of statistics, the weather was not unprecedented, nor was it really so bad as it appeared while it was being endured. So far as suppliers of water are concerned, they probably did not view with dissatisfaction the ample additions to their stores which the clouds furnished during the twelve months. There was doubtless a considerable falling off in the quantity of water employed for street-cleansing and sewer-flushing purposes, as the rain generally fell with sufficient force to do all that was needful in this direction. In fact, the sewerage system in London had to sustain in June the strain of no less than three times the usual volume of rain for the entire month being poured into it in the space of ten days. At the same time, this heavy downpour was not unattended by certain advantages. Nooks and crannies were reached, cleansed, and purified in a manner which otherwise would not have been possible. To this purifying effect of the rain it is not unreasonably thought may be attributed one remarkable feature of the past year—the exceptionally low death-rate, especially among infants. Unpleasant as the wet weather was for those who had to be a good deal out of doors, it was happily unattended by any special form of illness. The public health all over the country was indeed most satisfactory. With regard to agricultural operations, no doubt farmers and fruit growers were considerable sufferers from the rain. But we learn from "The Times" that the injury done was far less than might reasonably have been anticipated. There was an abundant hay harvest, the bulk of which was stacked in good condition, and there was an average crop of corn.

Messrs. Gibbons Bros., Limited, have just produced a very attractive catalogue of their elevating and conveying machinery. It is illustrated by high-class pictures—most of them being reproductions of photographs of machinery in actual use. But they are only representative of the work the firm have carried out in order to portray some of the principal applications of elevating and conveying machinery, and at the same time to give a general idea of their designs for these classes of work. The views comprise plant in gas-works for dealing with coal, coke, oxide, &c. Special notice is made of the firm's patent roller chain, which was described and illustrated in the "JOURNAL" for Sept. 22 last (p. 748). In a recent test, this chain stood a strain of 12 tons before one of the pins sheared at one end only; and the pin is depicted full size. The roller chain is also shown with special attachment links and brackets for fixing buckets. It is seen that the bucket is secured to the malleable cast bracket by means of four bolts, and not two as is usually the case. This gives a much firmer hold, and lessens the strain on the back of the bucket. Coal-breakers, elevators, conveyors, and revolving-screens, fixed in position and otherwise, with their principal members, are separately illustrated and described. Drawings are also given showing installations of inclined and horizontal retorts equipped with coal-handling plant, and also a barge unloading and storing plant.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 171.)

AGAIN the course of things on the Stock Exchange has see-sawed about—now rising, now falling, according as hopes and fears predominated. But, on the whole, the brighter view prevailed. Wherever prices rose, they were promptly checked by realizations; but, despite all, on the balance at the close of the week, a respectable advance in values was apparent. The volume of business was only very moderate; but in the sensitive condition of the markets, it did not take much to send prices up or down. In the Money Market, the supply was abundantly sufficient to cope with all requirements; and discount rates showed no disposition to harden. Business in the Gas Market was decidedly quieter—not to say humdrum, and quite devoid of any exciting feature. But the tendency was quite favourable; and the few changes of quotation which were effected were practically all in the upward direction. In Gaslight and Coke issues, the volume of transactions did not bulk up to much. But the figures at which dealings throughout the week were marked were very firm; and the closing price—88¾—was the best of the week. Once on Thursday a parcel was let go cheap at a low figure, possibly by some impressionable onlooker at the fire in Piccadilly the day before. The secured issues were moderately dealt in; and the preference was strong, but the debenture was not so. Debenture stocks in general have been inclined to give way of late. South Metropolitan was more than usually active, and was firm—the opening and the closing marks being 119½; and it looked as if it might well have been quoted a point higher. A couple of dealings were marked in Commercial 4 per cents; and the 3½ per cents improved a point. Very little business was recorded in the Suburban and Provincial group; but some improvements were effected. Crystal Palace debenture and Plymouth came out better on *ex div.* adjustment; and West Ham retrieved its previous loss of a couple of points. The Continental Companies were not in demand; and the prices realized were not of the best. A small advance in Buenos Ayres was all the change to be noted among the remoter undertakings. In the Water Companies, business was quite active; and there was considerable buoyancy pretty well throughout the list. Southwark recovered the 10 points it had lost the week before, and the marked price rose from 237 to 247; and several other issues had lesser gains.

The daily variations were: On Monday, Commercial 3½ per cent. rose 1. In Water, Chelsea gained 2½, and Southwark 2. On Tuesday, West Ham moved up 1. On Wednesday, West Ham rose 1 more, and Buenos Ayres ¼. In Water, Southwark was marked up 5, and East London 1. On Thursday, Crystal Palace debenture rose 1. In Water, Southwark gained 3; ditto 7½ per cent., 5; and East London and Grand Junction, 1 each. On Friday, Southwark preference went up 2, and Lambeth 7½ per cent. 5.

ELECTRIC LIGHTING MEMORANDA.

The Legal Aspect of the Marylebone Muddle—Probable Application to other Local Authorities—The Falling-Off of the Light of Incandescent Lamps—New Methods of Supply.

THE peculiar state of affairs in Marylebone has moved the "Local Government Chronicle" to offer a statement respecting the legal position of the Borough Council, which is one of the most remarkable points in the whole concern. The difficulty in question has arisen out of the wording of the Council's Special Act, which contains a clause in the following terms: "From and after the completion of the purchase of the St. Marylebone undertaking and business of the Company in accordance with this Act, the Provisional Order set out in the schedule to this Act shall be, and the same is, hereby confirmed, and shall have full force and effect as from the date of the commencement thereof; and when the Board of Trade are satisfied that the Borough Council have completed the purchase of the said undertaking and business in accordance with the provisions of this Act, they shall fix the date for the commencement of the Order." The effect of this section is that it requires the Council to complete the purchase of the undertaking before their Order can be put into force; and until the Order comes into force, the Council are without authority to raise the necessary loan to pay the purchase money. By way of defending the Council from the accusations of muddling and blundering that have been so freely brought against them in this regard, it is alleged that all local authorities who attempt to acquire electric lighting undertakings at the end of the periods for which the Provisional Orders have been granted will find themselves in a similar difficulty. If this is so, it is a remarkable circumstance that the fact should not have been detected until the application of the Marylebone Council came before the London County Council.

This point is of such interest that we have looked up the provision relating to the purchasing powers of local authorities under the Act of 1882, which is contained in section 27 of the Act. This states that the local authority may, by notice in writing, require such undertakers to sell, and thereupon such undertakers shall sell, to them their undertaking. The Board of Trade may

fix the date upon which the purchase is to take effect, or it may be agreed upon between the parties, and thereupon the property "shall vest in the local authority which has made the purchase." Here again, it appears, the act of purchase must precede the admission of the local authority to the *status* of statutory suppliers of electricity. How, then, are the authority to obtain the money necessary to this purpose? By section 8 of the Act, it is merely enacted that any local authority "authorized" to supply electricity may from time to time borrow money. Evidently, therefore, the Act does legislate within a circle. What is wanted is such a provision as that the purchasing local authority shall be deemed to be the authorized undertakers for the purpose only of enabling them to raise the necessary money for the purchase, until they shall have completed the transfer. The dilemma is a very real one; and Mr. Haldane, K.C., who was consulted by the London County Council on the matter, was unable to advise any means of getting over it in the Marylebone case. It is not known who was the sharp-eyed individual who discovered the objection in this particular instance; but it has been hinted that if the result of the arbitration had not been so startling to those who imagined that the Marylebone Council were in for a soft thing, nobody would have been inspired to practice the Old Bailey trick of hunting for a "flaw in the indictment." Be this as it may, it is true that among all the faults found with the Electric Lighting Acts, and they have been numerous, that of being unworkable in the way in question was not included. Meanwhile, it should be recorded that the Council have declined the latest suggestion of the Company mentioned in this column last week.

The discrepancy between the nominal and the actual illuminating power of incandescent electric lamps is something that users of these appliances discover as they go on. It is not a matter that a person trembling on the brink, so to speak, of going in for electric lighting would take seriously if it were brought under his notice; but he learns about it later. It is a subject of general complaint that incandescent electric lamps are not improving in quality, but are shorter-lived than their predecessors, which cost more. The important point for the consumer of electricity is that, though the lighting effect of a lamp deteriorates continuously with use, its consumption of current keeps constant at the original figure. That is to say, whereas the lamp may fall from its first 16 or 32 candle brilliancy to 5 or 10 candles, as the case may be, it is costing just as much for current as if it were yielding its full nominal illuminating power. Meanwhile, of course, the electricians take credit for supplying the latter. Thus we see their accounts kept with reference to an imaginary 8-candle lamp equivalent, which is the datum. It has small connection with fact. Apart from the consideration that if there were 8-candle lamps in use at one time, they have long since retired from the struggle with currents at 200 volts and upwards, it is the truth that, taking the average of all the incandescent electric lamps employed in a town at any moment it is always something considerably under the nominal illuminating power of the lamps. When the money value of this is considered, it makes the nominal price of the unit as much below the mark as the booked effect of the lights in service is above the actual.

Speaking of the falling-off of electric lamps in brilliancy after a brief period of usage, it is remarked that proneness to this defect is one of the characteristics of the Nernst lamp, which is being rather extensively tried for public lighting. The nominal illuminating power of these lamps is somewhat high, being 42 or 84 candles; the larger lamps being the better in service. They work tolerably well, moreover, at the high voltages which are becoming more and more fashionable. This is an important consideration for suppliers of current, because nowadays the combination of electric lighting with tramway traction is growing in favour, *vice* lighting and dust destruction retired. Though the tramway load does not bring in much profit, if any, at the price which has to be charged for it if the business is to be made to appear respectable from the other side, municipal suppliers of electricity like it because it makes the accounts look big. Besides, it is all of a piece with the power branch, which does not pay either. The question that is to be answered is whether tramways, motors, and Nernst lamps, all supplied at 500 volts, will fill the bill better than the comparatively old-fashioned incandescent lamps served in the original way. Who knows? At any rate, it is a more novel, and perhaps quicker, fashion of losing money, as some localities are already learning.

GAS AS A FUEL.

THE manufacturing and industrial purposes to which the application of gas is pre-eminently suitable are so numerous as to render the task of describing and illustrating representative types of appliances in use an extremely formidable one, if done in anything like a thorough manner. The naming of the purposes to which gas is not applicable as a heating agent would be far easier; but then the result would be of no practical utility whatever. On the other hand, the compilation of a catalogue showing the operations that can be successfully and advantageously carried out by its aid must be of very great benefit alike to the suppliers of gas and to existing and prospective consumers. This fact has been fully realized by those responsible for the management of the Denver Gas and Electric Company, with the result that last summer they turned their attention to the collecting of information that would enable them to prepare an illustrated and descriptive catalogue of fuel-gas appliances now in successful employment. That no time has been lost in carrying out the idea, will be appreciated from the fact that a finished copy of the book is before us; and those who are responsible for it are to be heartily congratulated upon the success which has attended their efforts.

Appliances intended for purely domestic use have been excluded from the catalogue; and the Company point out that it has not been their intention to illustrate and describe all other industrial appliances using gas for fuel, but to represent types only, and to give such information as will enable gas managers and prospective consumers to secure from the manufacturers direct more detailed particulars regarding their various products. Taking, for instance, gas-engines, it will be found that only two types are referred to—the Westinghouse, varying in size from 10 to 650 horse power, and the Fairbanks-Morse, which is made in from 2 to 150 horse power sizes. It would have answered no good purpose, even had it been possible, to give particulars as to every gas-engine on the market; and the examples quoted are quite sufficient to afford an idea of the wide range over which their capacity extends. It is, of course, in the less well known appliances that interest principally centres. It may be presumed that at this time of day everyone is more or less aware of the advantages attending the installation of a gas-engine, at any rate where steam is not required for some other purpose. But there are still doubtless a great number of people who are ignorant of very many of the other uses to which gas can just as effectively be put. That there are few businesses which are not in some way concerned with the catalogue, will be seen from the variety displayed by the "Index of Industries" and the number of different suitable types of appliances described.

The following are the headings of this index; the number of appliances relating to each being given in parentheses: Assayers' and chemists' laboratories (23); automobile, bicycle manufacturers, and tinners (20); badge and suspender makers (2); bakers, confectioners, and candy makers (11); barbers and hairdressers (5); barrel manufacturers (4); billiard parlors (2); blacksmiths (10); brewers and bottlers (3); boiler makers (4); bookbinders (8); butchers (2); cabinet makers (2); can manufacturers (9); canners (5); carriage and waggon manufacturers (5); chemical manufacturers (4); china decorators (1); cigar box manufacturers (2); cigar manufacturers and stores (2); cloth manufacturers (2); commission merchants (4); corset makers (2); cutlery manufacturers (10); druggists (4); electric light bulb makers (2); electrotypers and engravers (8); florists (1); foundries (10); furniture and moulding manufacturers (4); grocery, tea, and coffee dealers (4); harness makers (2); hatters (4); hospitals, physicians, and dentists (18); hotels and restaurants (23); implement manufacturers (18); jewelry manufacturers (16); laundries (20); leather goods manufacturers (3); macaroni makers (2); machine and locomotive shops (20); nail manufacturers (2); packers (3); paint, oil, and varnish manufacturers (4); photographers (4); potteries (2); printers and newspaper offices (17); shoe manufacturers (2); and tailors and dressmakers (5). Of course, many of the things are mentioned several times, as being suitable for more than one purpose; but nevertheless there are about 200 different appliances illustrated and described in the catalogue, which is practically confined to goods supplied by American firms—England being represented in only three instances (by Messrs. John Wright and Co.), and Germany in two.

With most, if not all, of the appliances enumerated, or others designed for the attainment of similar objects, our readers are, of course, quite familiar; but there are some ingenious arrangements to be found in the book which will be a revelation to those whose opportunities for acquiring a knowledge of the capabilities of gas as a fuel have not been so extensive. In nearly every case, too, the approximate quantity of gas required for operating apparatus of a given size is stated, and the various advantages attending its use are set forth, so that persons who contemplate the adoption of this fuel will generally find just the information they need to enable them to come to a decision. The cost of preparing the catalogue in the very attractive style in which it has been done must have been far too great to justify its distribution broadcast among the people of Denver; but if care is taken and it finds its way into the proper hands, the Company cannot fail to derive great benefit from their labour and outlay. At the same time, the makers of the apparatus will enjoy the advantage of thus having public attention directed to their wares; and manufacturers and others will gain by having pointed out to them the fact that there are few purposes to which gas cannot be advantageously applied. Under these circumstances, it is impossible to do other than praise the Denver Gas and Electric Company for the enterprise they have displayed in the publication of so useful a book. But even now finality has not been reached; for the Company hope in the near future to publish a revised edition which will include any new appliances or those that may have been overlooked.

Mr. Samson Fox, of British water-gas "fame," whose death was announced in the "JOURNAL" for the 27th of October last, left estate of the value of £152,290.

Captain A. J. CORSE-SCOTT, J.P., has been elected Chairman of the Southampton Gas Company, in succession to Dr. Trend, whose death occurred early last month.

GAS BILLS FOR 1904.

(*Continued from p.* 78.)

THE Appleby Corporation Gas Bill is to empower the Corporation to purchase the undertaking of the Appleby Gaslight and Coke Company, originally formed in 1837. The share capital of the Company consists of £4000 paid up, with a loan of £350. The transaction was agreed upon by the parties last year; but difficulties have arisen in carrying the agreement into effect. It is provided that the Company and the Corporation may agree upon a single arbitrator; and that to save expense only one Counsel and two expert witnesses—one of whom may be an accountant—shall be examined on either side. The undertaking is to be transferred on an agreed date, or, failing agreement, on such date, being within three months of the determination of the amount of the purchase money, as the Corporation may fix. The limits of the Corporation for the supply of gas are to be the borough. The maximum price of gas is put at 5s. per 1000 cubic feet, subject to such discounts as the Corporation may prescribe. Gas of 14-candle power is to be supplied, tested on the works or within 200 yards thereof, by a "London" argand burner No. 1, with a 6-inch by 1¾-inch chimney. Prepayment meters may be used; but the Corporation are not to be deemed to have received the money paid by this means until it has been collected. It is desired to borrow the money required for the purchase of the undertaking, besides £2000 for the extension and improvement of the works and £1000 for working capital. Corporation lands may be appropriated for the purposes of the Act. Power is sought to apply the gas revenue to advertise the attractions of Appleby.

The Barnard Castle Urban District Gas Bill is to empower the Council to purchase the undertaking of the Barnard Castle Gaslight Company, Limited, which dates from 1835. The capital of the Company recently consisted of £3744 consolidated stock, but in 1902 the nominal capital was increased to £20,000 by the addition of £16,256, divided into 15,256 £1 shares. By a contract dated Oct. 22, 1902, 3744 of these shares were issued to the shareholders gratis; and it was provided that the remaining 12,512 shares should be issued as might be agreed. The Company have borrowed £1500. The provisions for the transfer are in the usual terms. The gas limits are defined. The maximum prices of 14-candle gas are put at 4s. per 1000 cubic feet within the district, and 5s. beyond, subject to discount. The gas is to be tested on the works by a "London" argand burner No. 1, with a 6-inch by 1¾-inch chimney, and supplied at minimum pressures of 7-10ths and 9-10ths. The sum of £10,000 is required for improvements and for working capital. Certain provisions of the Public Health Act, 1875, with respect to mortgages are to apply.

The Chesterfield Gas and Water Board Bill is to authorize the Board to extend their gas lands compulsorily, with power to take parts only of certain properties scheduled. The quality of gas supplied is to be altered to 14 candles. The additional sum of £6000 is required for gas-works purposes.

The Doncaster Corporation Bill contains a part relating to the gas undertaking, which has belonged to the town since 1858. The limits of supply are to be extended, and the works enlarged. The maximum price of gas is put at 4s. per 1000 cubic feet of 15-candle gas tested on the works by means of a 24-hole argand burner, or such other burner as shall for the time being be approved by the Board of Trade on the application of the Corporation. The excess price of gas to cover the use of a prepayment meter and fittings is 10d. per 1000 cubic feet. A clause proposes that the Corporation may supply for purposes other than illumination any other substitute for coal-gas not containing more than 14 per cent. of carbon monoxide. Special terms and discounts may be arranged for sales of gas. The additional capital sum of £40,000 is required for gas-works purposes. The existing gas bonds are to be made statutory.

The Filey Improvement Bill contains a part relating to gas. It proposes to extend the limits of supply to include the parish of Muston. Additional gas capital is required, as the Local Government Board may from time to time authorize.

The Kirkby-in-Ashfield Urban District Gas Bill is to empower the Council to supply gas and to provide for the transfer to the Council of so much of the undertaking of the Sutton-in-Ashfield Urban District Council as is situate within the former district. The undertaking was transferred from the former Company to the Local Authority by an Act of 1878, which contains provision for severance in favour of any outlying authority. Part of the proposed district is within the area of the Riddings District Gas Company, but is without gas. The new limits are defined. The purchase of the severed portion of the Sutton undertaking is to be carried out by notice to be given within two months from the passing of the Act. The maximum price of gas to be charged by the Council is put at 5s. per 1000 cubic feet, tested on the works or at the offices by a "London" 16-candle argand No. 1 burner, burning at the 16-candle flame rate. Discounts up to 25 per cent. are to be allowed for prompt payment or large consumption, or of any amount the Council may prescribe for gas supplied by contract or for motive power. Contracts for gas supply are not to disqualify members of the Council.

The Lytham Improvement Bill contains a part relating to gas. It is proposed to enact the usual modern gas clauses, and to appropriate surplus gas profits in order to advertise the attractions of the town.

The Rotherham Corporation Bill contains provisions to regulate the limits of supply by the Corporation and also by the Sheffield United Gaslight Company. The Corporation limits are otherwise extended. The candle power of the gas is to be reduced to 14, and the maximum price to 3s. 3d. per 1000 cubic feet. In regard to money in prepayment meter cash-boxes, it is proposed that thefts shall be treated as simple larceny, and be punished accordingly on the prosecution of either the gas consumer or the Corporation, for which purpose the property in the money may be laid either in the gas consumer or in the Corporation. The sum of £10,000 is required for working capital of the gas undertaking, repayable in 25 years.

The Selby Urban District Council Bill contains a part relating to gas, which provides that the limits of supply shall be the district and the parishes of Barlby and Brayton. The maximum price of illuminating gas is to be 5s. per 1000 cubic feet, and the prescribed number of candles for such gas is to be 13. Certain clauses of the Act of 1871 are not to apply to power gas, or to any other gas supplied by the Council for other than illuminating purposes. Power gas supplied by the Council is not to contain more than 14 per cent. of carbon monoxide. The use of proportional meters for power gas is contemplated.

The Shipley Urban District Council Bill is to authorize the Council to purchase the gas undertaking of Sir Titus Salt, Bart., Sons, and Company, Limited. In 1901, the Council were duly authorized to acquire the undertaking of the Shipley Gaslight Company; and in 1903 the Bradford Corporation were authorized to acquire from the Council, at the price of £31,000, the portion of the undertaking of the Council then situated within the city. The Sir Titus Salt Company are the owners of a large landed estate within the urban district of Shipley, and supply their own gas therein, which undertaking they have agreed to sell to the Council upon terms scheduled in the Bill. This agreement is to be ratified and confirmed. The amount of the purchase money is £33,000; and it is proposed to make use of the sum received from the Bradford Corporation for the other gas property sold last year towards this payment. The Council were without powers to lay pipes in private roads, and now propose to take such powers.

The Wallasey Tramways and Improvement Bill contains gas clauses. It proposes to extend by three years the time for the purchase of land and the construction of a railway to the gas-works. Discounts up to 10 per cent. are to be allowed for prompt payment of accounts.

The following Bills relate to the supply of Power Gas.

The North-Western Electricity and Power Gas Bill is to extend the statutory powers obtained by the Company in 1903. Additional lands for generating stations are scheduled for acquisition at Tunstall, Stoke-on-Trent, Fenton, Wrexham, Connah's Quay, and Glossop, in the counties of Stafford, Derby, Flint, and Denbigh. It is proposed to incorporate the Land Clauses Acts, and portions of the Gas-Works Clauses Acts, 1847 and 1871, which do not relate exclusively to the supply of gas for lighting purposes. The Company desire to be empowered to acquire by agreement, but not otherwise, any Electricity Supply Orders granted to undertakers within the limits. It is intended to repeal section 110 of the Act of 1903, and make provisions for the payment of interest out of capital to the amount of £45,000 for four years from Jan. 1, 1905, under certain conditions.

The Cheshire Electricity and Power Gas Bill is to incorporate a Company for the supply of Mond gas, not for illumination, within the area of Cheshire and the whole of the borough of Stockport. The scheduled lands to be taken for the generating stations are at Runcorn, Dukinfield, Bollington, Middlewich, Neston, Timperley, and Altrincham. The nominal capital of the Company is £1,000,000, with one-third borrowing powers. The principal provisions of the Bill, as to the nature, price, measurement, and testing of power gas, and the methods to be followed by the Company in carrying on their undertaking, are the same as in the other Bills of similar origin. The works are to be substantially commenced within two years from Jan. 1, 1905, and the supply made effective within seven years thereafter. Interest is to be payable out of capital during the construction of the works, for four years from the same date, to the aggregate amount of £40,000. One Director of the Company is to be appointed by the Power Gas Corporation, Limited.

The Belfast and North-East Ireland Electricity and Power Gas Bill is to incorporate a Company with the objects indicated in the title. The expression "Power Gas" is explained to mean Mond gas and any development thereof approved by the Board of Trade, not for illuminating purposes. The scheduled sites for generating stations are in the City of Belfast, at Larne, Ballymena, Coleraine, Edenderry, and Newry. The area of supply is an extensive region in the counties of Londonderry, Antrim, Down, and Armagh. The Company desire power to manufacture, acquire, maintain, use, sell, and let on hire all appliances for dealing with power gas except for lighting purposes. It is sought to obtain sanction for the opening up of any streets for the purpose of laying gas-mains. The supply of power gas is to be obligatory for premises within 100 yards of any main, on a seven years' contract (if required) to pay so much for the same as will return 20 per cent. per annum on the special outlay by the

Company. The minimum compulsory supply is 1 million cubic feet in a year; and the supply is not to be given to private dwelling-houses. The use of proportional meters may be prescribed. The charge for power gas is to be not exceeding 3d. per 1000 cubic feet for not less than 4 millions per quarter, and 4d. per 1000 cubic feet for smaller quantities: Provided that the prices may be raised ½d. per 1000 cubic feet for every shilling that the cost of suitable slack delivered at the Company's works exceeds 6s. per ton. The Company are not to supply any power gas which contains more than 14 per cent. of carbon monoxide, or does not possess a distinctive and readily perceptible smell. It is also to have a minimum calorific power of 125 B.T.U. per cubic foot at 32° Fahr. and 30 inches barometrical pressure; the product of combustion being cooled to 60° Fahr. The nominal capital of the Company is £1,500,000, whereof £100,000 is to be subscribed before the compulsory land-purchase powers are put in force. The Company may borrow £500,000. If the profits of the Company in any year shall be more than sufficient to pay a 10 per cent. dividend, one-third of the surplus is to be applied to the formation of a reserve fund, another third in reduction of the charges for electricity and power gas, and the remainder in increasing the dividend. One Director is to be nominated by the Power Gas Corporation, Limited. The Company's charges may be revised by the Board of Trade after ten years. If within two years from Jan. 1, 1905, the Company have not substantially commenced their works, or if within seven years the Company have not provided an effective system of power gas, the statutory powers are liable to be abrogated. Provision is made for the abandonment and removal of disused mains. Interest is to be payable out of capital for four years from Jan. 1, 1905, to the amount of £60,000. An agreement with the Power Gas Corporation is scheduled.

THE CHEAPEST POWER.

MANY readers have been interested in the remarks made by Mr. Samuel Cutler at the recent meeting of the Junior Institution of Engineers on the subject of the discount that the Commercial Gas Company allow for gas used for power purposes; and doubtless some further information as to what the Company are doing will be welcomed. It is found in a leaflet enclosed in a cover and printed in a style so attractive that one is led to fancy, before examining the contents, that they are of a lighter nature than the financial aspect of using gas for power purposes as compared with electricity. The author of this little production has no hesitation in hitting out straight from the shoulder, for he puts as his title on the front page of the cover "The Cheapest Power," on the first inside page "The Only Power for those who Study Economy and Efficiency," and as a heading to the inner matter are the words "Electrical Power is Three Times more Costly than Gas Power." Then follows the proof of the assertion drawn from the experience of Messrs. Hacker Bros., at their mills at Old Ford, where they have replaced an electric motor by a "Stockport" gas-engine. The actual charges during the weeks of comparison are given. Electric current for eleven weeks at 1·8d. per unit works out to £54 9s. 5d.; and gas for twelve weeks at 2s. 3d. per 1000 cubic feet to £20 5s. 5d. The cost of electricity therefore averaged £4 19s. per week, and gas £1 13s. 9d., or a saving by using a gas-engine of £3 5s. 3d. per week. The difference is really greater than the figures show, as the firm made additions to the mill (including 40 feet of main shafting) after they discarded the electric motor, which again was only something like half the power of the gas-engine. The Commercial Company have met with a great deal of success with their discounts for gas used for motive purposes. The gas is, of course, registered by separate meter. The current rates of discount (the ordinary price of gas being 2s. 6d. per 1000 cubic feet) commence with 10 per cent. on amounts not exceeding £100 per annum, and rise by 2½ per cent. in £50 stages until 20 per cent. is reached on sums exceeding £250.

IMPERMEABLE CEMENT CONCRETE.

THE subject of waterproof building construction has been mentioned several times in the "JOURNAL," with reference both to gasholder tanks and above-ground walls. It has been shown that this quality of water (that is, of weather) resisting masonry construction is the last perfection requisite to ensure the durability of buildings in climates liable to seasons of wet and frosty weather. Where this quality is lacking, in such climates buildings of brick or stone cannot be deemed permanent structures; so that it is necessary to spend money in repairing them, and even for "restoring" them after a period of neglect. The possibility of water-resisting building dawned with the day of portland cement. Prior to the discovery of this invaluable material for making waterproof mortar, engineers had nothing wherewith to build an underground tank in brick or stone to hold water, except the immemorial expedient of puddling behind the walls with clay. With the advent of portland cement, however, came the fashion of "rendered" tanks, which are built in larger numbers every year. After this stage of experience in the employment of portland cement to render tanks water-tight, it was some time before engineers generally realized the advantage of waterproof building above ground. This was doubtless because the idea of water resisting could not be associated with walls of brick or stone—both being notoriously pervious to moisture. Still, the practice of building in cement mortar instead of lime and sand mortar grew in respect to all exposed structures; and such walls are far less permeable by wet and frost than those built in common mortar. In addition to this advantage, the greater ease of building in cement during frosty weather was slowly appreciated in the more severe climates; so that the long suspension of building operations during a northern winter is a thing of the past. Experience has shown that by the exercise of a little ingenuity and forethought in keeping the frost out, most building operations can be carried on in the hardest weather.

It was only with the development of the latest kind of building material, cement concrete, that the practice of completely waterproof construction—through and through, and not merely on the surface—acquired its final triumph. There is, obviously, all the difference in the world between building (say) a gasholder tank of permeable material and rendering it waterproof afterwards by some kind of surface treatment, and making it water-resisting throughout as a feature of the construction. The latter is the result, briefly, of mixing the cement concrete very wet, and laying and ramming it solid. In this method of construction, the use of the trowel is abandoned, which means a great deal. The ideas of bricklayers and stonemasons as to walling are got rid of; and the work is done entirely by the aid of wheelbarrows, shovels, and rammers. It is a different technique from that of the bricklayer or the mason, who are not so good at it as men without any craft prejudices. There is plenty of scope, in the new system of construction (whether or not the concrete be reinforced by iron or steel members) for the investigation and application of a new science. All young engineers should endeavour to become as expert as their opportunities permit in the various researches and experiments. French authorities have led the way in this direction, and have achieved some notable successes in the application of theory to concrete constructions.

One of the best workers in the new field is M. Feret, chief of the Boulogne laboratory of the Ponts et Chaussées service, to whose investigations reference was recently made in the "JOURNAL" (*ante*, p. 288). For some five years M. Feret experimented in order to ascertain the effect of sand in concrete; and he wished to draw a distinction between the porosity of a concrete, or its capacity of absorbing water, and its permeability or power of letting water through. Generally speaking, the most porous mortars were found to be the least permeable. The most permeable are the poorest in cement; and this seems natural. The minimum permeability is obtained with about an equal mixture of coarse and fine grains of sand, with a small proportion of medium-sized grains. Neat cement is least permeable of all; but, of course, no large constructions can be made of neat cement, and it is important to find how to obtain the best results from such concretes as it is possible to work with. Age has something to do with this quality of permeability. Makers of gasholder tanks and reservoirs in concrete which are not quite tight when first filled, should take comfort from the fact that with a given mortar there is a decrease of permeability with age. M. Feret made a set of experiments designed to settle this point, beginning with exposures to the action of water for an hour, and going on for a week. At the end of the latter period, practically no water came through samples permeable at the beginning. This action is attributed to the attack on the cement by the lime-carrying water. The obvious conclusion therefrom is that an addition of lime is the expedient indicated for the making of cement mortar or concrete water-tight. Mr. Robert W. Lesley, the President of the American Cement Company, is reported to recommend the addition to concrete, at the time of mixing, of a modicum of slaked lime. This is entirely to stop percolation, and make the mixture effectively water-tight. According to certain experiments quoted by the "Engineering Record," such an addition is harmless, and merely retards slightly the time of setting, which is no disadvantage. If by so simple an expedient an otherwise permeable mixture of cement and aggregate is rendered tight, the fact cannot be too widely disseminated; and we lay it before our engineering readers for corroboration in the only satisfactory way—by actual trial under ordinary service conditions.

In a paper in the "Technology Quarterly," Messrs. C. E. A. Winslow and C. P. Nibecker discuss the significance of bacteriological methods in sanitary water analysis. They consider that the real application of chemistry begins where that of bacteriology ends. When pollution is so gross that its existence is obvious, and only the amount need be determined, the bacteriological tests will not serve, on account of their excessive delicacy. In studying the gross pollution of streams, the treatment of trade wastes, and the purification of sewage, the relations of nitrogenous and oxygen compounds are of prime importance—that is, when pollution is to be avoided—because the decomposition of chemical substances causes a nuisance, it must be studied by chemical methods. When the danger is that of infection, and arises only from the presence of bacteria, bacteriological methods furnish the best index of pollution.

THE DIDIER-STETTINER SYSTEM OF INCLINED RETORTS IN ENGLAND.

Its Installation at Plymouth, and other Works Extensions and Improvements.

WHOEVER in the gas industry refers to Plymouth in respect of gas affairs does so, as a rule, to cite it as an example. Over a long course of years, in gas nomenclature, Plymouth and Progress have stood in the same class; and the progress there has been the fruit of good management rather than the result of any fortuitous or extraordinary environment, though in smaller measure perhaps this has had a contributory effect. A low working cost has placed the Company one—or is it two steps?—from the top of the tree in the matter of low-priced gas. This, we are afraid, the good people of Plymouth do not appreciate to the extent that it is appreciated in the gas industry beyond the borders of their ancient and historic town. It is, they may be assured, a distinguishing honour in the gas industry to be able to point to the supply of gas year after year since 1888, with two or three exceptions, at the figure of 1s. 9d. per 1000 cubic feet; and to a no higher price than 2s. 3d., with a quick recession to 2s., and again to 1s. 9d. during the late period of extreme charges for coal. This record furnishes the example that has been so frequently quoted in the Parliamentary Committee-Rooms, in Council Chambers, in Board-Rooms, and at places where gas men assemble for mutual discussion and benefit.

What are the prospects of a continuance of the occupancy by the Gas Company of this front position? A visit to the gas-works at the present day, a chat with the active Chairman of the Company (Mr. J. A. Bellamy), whose views on gas matters are of the most enlightened order, and with the Engineer (Mr. Percy S. Hoyte), give all that is required for a safe answer. Throughout the works are now seen the evidences of a judicious adoption of plant that will be productive of an economy which will leave its impress upon the financial aspects of the operations; and, in conversation, it is found that no obstacle of insurmountable magnitude—not even the Corporation electric lighting undertaking, which is worked on the lines of the common, far-reaching pseudo-municipalism—has been placed in front of the progress of business. Take the last decade. In 1893, the output of gas was nearly 605 million cubic feet; by 1903, some 50 per cent. had been added, making the consumption that year no less than 931 millions. The financial year of the Company ends on March 31; and at the rate of increase which the Company are experiencing this year—7 per cent.—by its close, in a little more than two months time, the prospect is the output will have topped 1000 millions. The maximum day's output so far this winter has been 4,800,000 cubic feet. Furthermore, the Company have taken those steps which will be

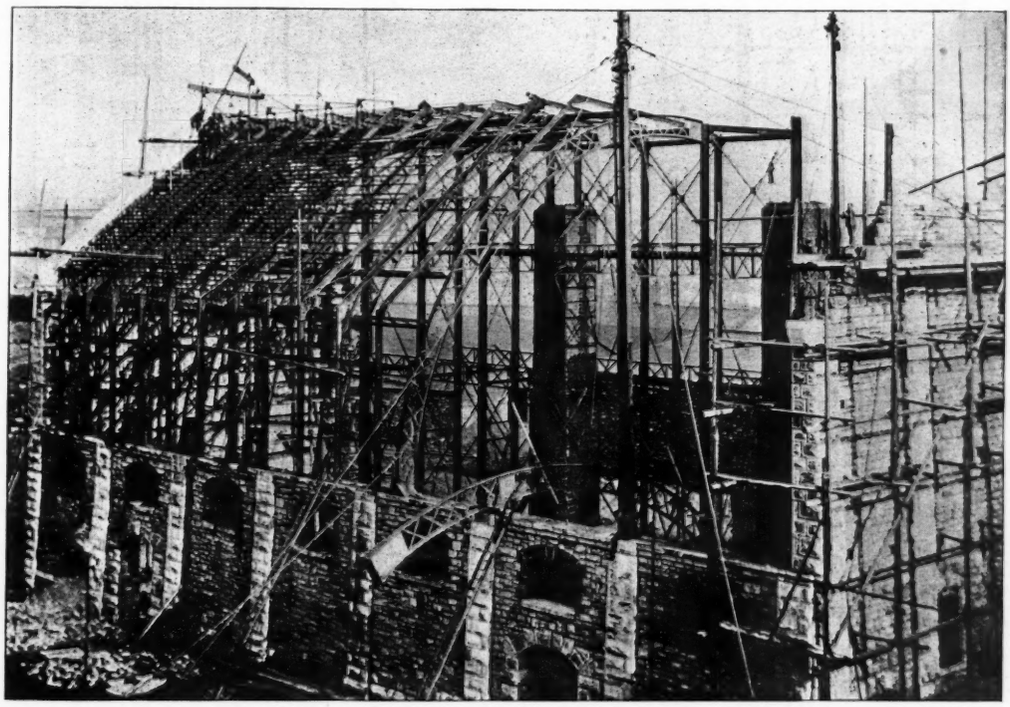


FIG. 1.—ROOF AND ARCADE OF THE INCLINED RETORT-HOUSE IN COURSE OF CONSTRUCTION.

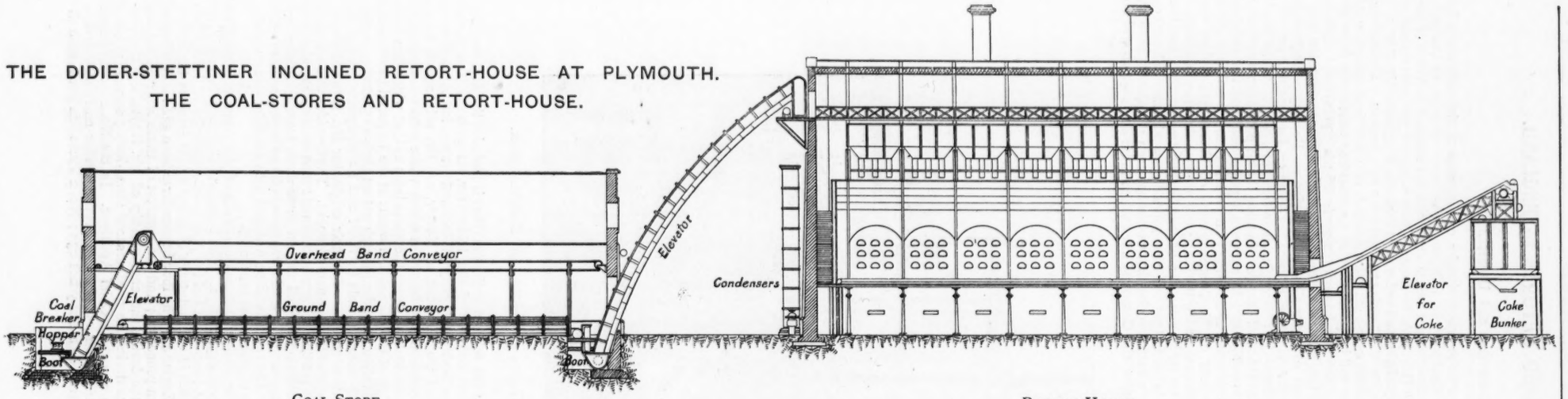
useful to expansion and further economies upon those which will be produced by the works plant, by securing the agreement of Parliament to the supply of 14-candle power gas, and to the enlarging of their area of supply, when the circumstances are propitious, to Crown Hill on the one side and Plymstock on the other, as well as to Tamerton Foliott and Egg Buckland, in which extended district they have been granted the right to charge a differential rate of 1s. per 1000 cubic feet, which, anyway, will give to those townships, when the time arrives, a supply of gas at a price much lower than would possibly obtain under an independent service. In other words, they will secure the benefit of the excellent management that has made the Plymouth Gas Company noted among its kind. Reviewing all which, it is not difficult to say that—the markets for materials and bye-products remaining favourable—the inhabitants of the great south-western seaport will continue to enjoy, as for the past fifteen or sixteen years, a gas of low price, and the proprietors in the Company the honourable position of which they have so long held possession.

ON THE WORKS.

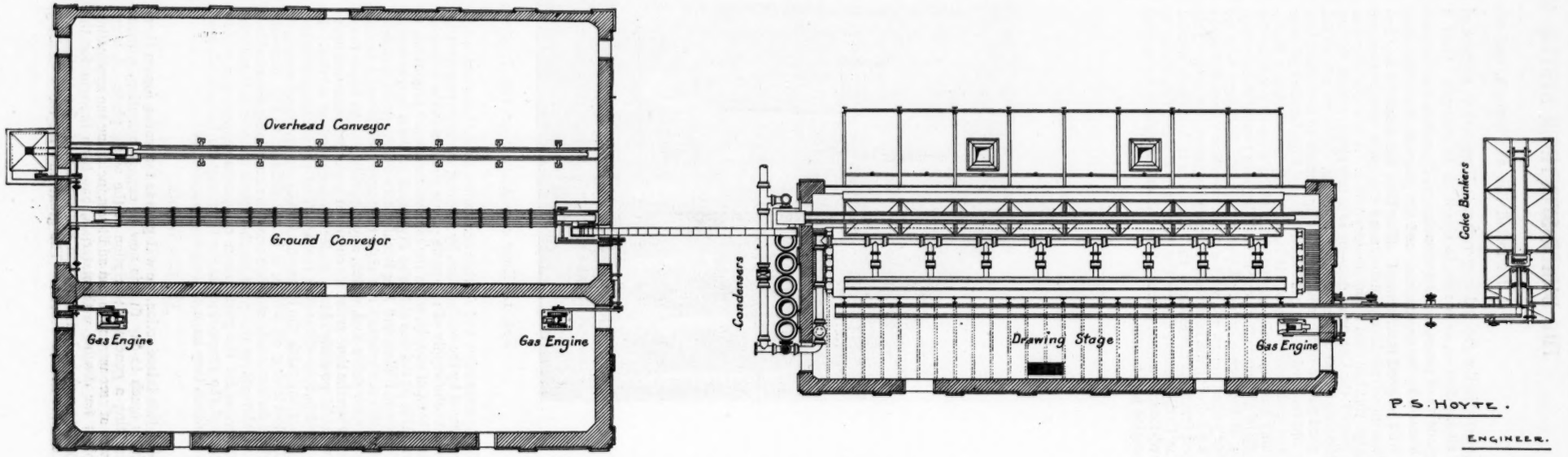
With this introduction, we will pass to the works, for on them there is much to-day that is new to engage attention, without attempting a general description of the whole plant. A large scheme of reconstruction and additions, including the application of plant for dealing with materials, has been brought for the present to a close, but provision has been made for continuing the scheme in due season. The great and interest-absorbing feature of the scheme is the fact that it includes the first installation in this country of the Didier (or, as perhaps it is better known, the Stettiner) system of inclined retorts, for which Messrs. Willey and Co., Limited, of Exeter, are the sole agents here; also the erection of a house (in which these retort-settings have been established) on much the same lines as that which has been constructed at the Mariendorf works of the Imperial Continental Gas Association at Berlin (though not on such an extensive scale), and which comprehends in itself and its equipment many improvements which have for their originator Mr. Edward Drory, the Engineer of the last-named works. The considerable adoption which this particular form of inclined retort-settings has obtained on the Continent is well known to readers from the published statements; and Plymouth represents its commencement in this country. The results will be watched with considerable curiosity. But more on this point presently.

It will be well to preface the details of the construction with a few words of explanation. The Plymouth Company formerly had four retort-houses, all built of that solid character, of local limestone, which is characteristic of many works away in the south-west of England. The four houses have been gradually adapted to modern processes; and the greatest of these adaptations has taken place during the engineership of Mr. Hoyte, and the previous ones during his predecessors' time, during several years of which he was their Chief Assistant. In the No. 1 retort-house, carburetted water-gas plant, of Messrs. Cutler and Sons' design, was constructed a few years ago; No. 2 house has been, with the

THE DIDIER-STETTINER INCLINED RETORT-HOUSE AT PLYMOUTH.
THE COAL-STORES AND RETORT-HOUSE.



COAL-STORE. RETORT-HOUSE.



PLAN OF THE COAL-STORE AND RETORT-HOUSE.

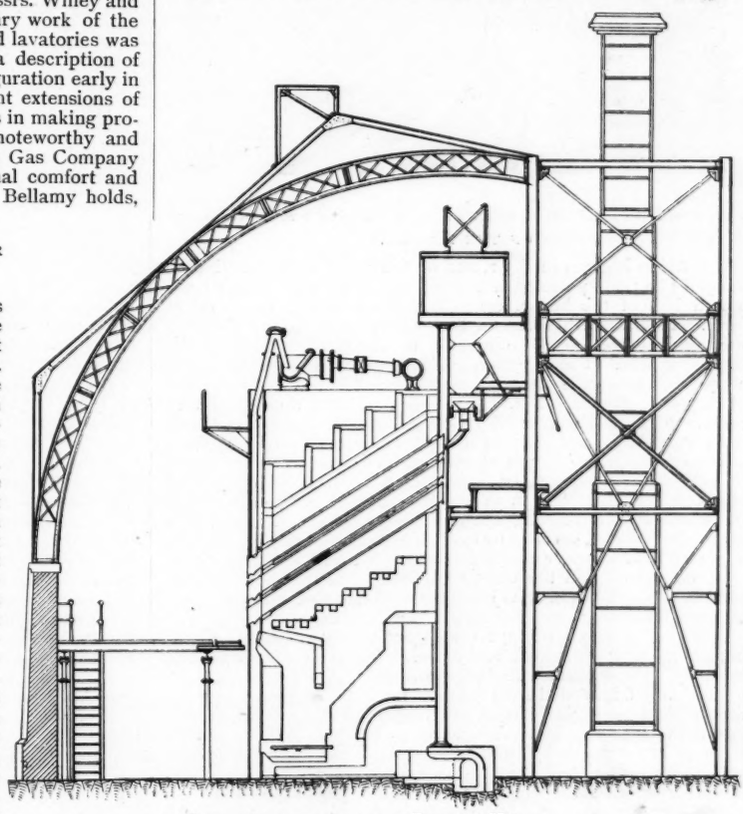
exception of one side wall, completely pulled down, and on its ground now stands the new inclined retort-house; part of No. 3 house has been utilized for new exhausters, a Livesey washer, and the opposite end for a cyanide plant; and No. 4 house has been converted into a coal-store. An additional retort-house, now known as No. 1, contains horizontal settings operated by West's charging and drawing machinery, and capable of making 2½ million cubic feet of gas a day. The new inclined retort-house, so far as constructed, is equal to a daily output of 1½ millions; and when the plans for its duplication are carried into effect, its total productive power will be 3 millions. This indication of the considerable changes that have been made in the character of the works, while showing a complete revolution in the methods of working, will facilitate the pleasurable task of describing the last and important features of these changes, which comprise: The reconstruction referred to of No. 2 retort-house; the installation of the Didier settings and the ancillary appliances, with coal and coke handling plant; an extensive set of new purifiers for the water gas, with plant for dealing with the purifying material; coke elevating and conveying appliances, with storage hoppers, for the feeding of the water-gas generators; and a splendid range of buildings, consisting of mess-rooms, lobbies, lavatories, and bath accommodation for the men. In all of which work there is, as said, plenty to engage the attention. With the exception of the erection of the men's rooms, the whole contract for the work mentioned was placed in the hands of Messrs. Willey and Co., Limited; and the Architect for the masonry work of the inclined retort-house and for the mess-rooms and lavatories was Mr. W. H. May, of Plymouth. We shall defer a description of the new mess-rooms until after their formal inauguration early in February; but it may be said here that in recent extensions of works the interest that is now taken by Directors in making provision for the comfort of their men, is a very noteworthy and gratifying feature. In this respect, the Plymouth Gas Company have done exceedingly well. Care for the personal comfort and happiness of the men is one of the things, Mr. Bellamy holds, that make the wheels go round smoothly.

The Inclined Retort-House and the Didier Settings.

The new inclined retort-house and the settings form, if we may so term it, the *chef-d'œuvre* of the extensions and additions; and therefore they must of necessity receive the first detailed reference. It will naturally be asked by engineers what are the features of this installation, as a whole, which differentiate it from other similar systems constructed in this country. It is a fair inquiry in view of the fact that it had its origin in Germany. But this suggests a point over which we may be pardoned for making a little digression. It must not be forgotten that the system of carbonization in inclined retorts is an exotic, no matter by what name it is now known. It was in Rheims—not in any town in England—where it was originally brought up to a stage which made possible its ultimate successful application; and we in Great Britain, while admittedly having done a considerable part in the bringing of the system to perfection, have not been backward in taking to ourselves the advantages which the first development offered. Therefore, there is no reason, if from abroad there comes further improvement (if such it be), why the benefit of it should not be enjoyed. We have our insular prejudices; other countries have their native bias. But in the gas industry, there has always been, between one country and another, a reciprocity in the matter of profitable invention which has worked to the general advantage. In this Plymouth case, as a matter of fact, the work is a composition of English and German material and improvement, and the labour that gave it its present form is entirely English. The design of the house, as adapted for this purpose by Mr. Hoyte, is that of Mr. Edward Drory—as true an Englishman as ever adopted a foreign country for his professional work—and to that design (the result of successive improvement and experience) the house at Mariendorf was constructed. In other respects, too, as will be seen, the house contains helpful and work-easing improvements which Mr. Drory has effected; and, in short, the whole installation may be described as a replica on a reduced scale (in respect of the number of settings) of that at Mariendorf. In the settings themselves—in the principle of their construction, as to which more will be said later—is found the meritorious work which comes from Stettin, and which gives to them the name of the Didier or Stettiner system.

But we must hark-back to the point as to the features which distinguish this house from others previously constructed. The first is the exceptional provision made—wisely, where space is available—for ventilation. This will immediately strike all visitors who have not been to Mariendorf, or who have not (from the description of the house there, published by Mr. Drory), been able to mentally construct a representation of what he regards as essential in respect of this important feature of inclined retort work. Ranking equally with the method of constructing the house are the settings, one of the outstanding features of which is the complete internal construction by means of specially moulded fire-clay blocks, instead of fire-bricks. Another feature is the arrangement of the charging-stage; and a still further one is the easy accessibility of every part of the plant for inspection and cleaning. It was these features (which will be alluded to with greater fulness), combined with the splendid performance of the settings, that weighed with the Directors and Engineer of the Plymouth Gas Company—after inspecting several other installations—in selecting as their pattern the house at Mariendorf.

Coming to details, the house claims, in order, the first consideration. The only part of the old house that stands in the new one is the west wall, which is shown in the forepart of fig. 1; and the only exterior masonry work required was the building of the end walls. These, as is the case with the pre-existing wall and all the other large buildings on the works, are composed of local limestone; and the substantial character of the work is sufficiently depicted (without other description) in the first illustration. The west wall (which is 22 feet high), and contains seven bays, was not raised; but from the wall top to the height of the side of the building, wooden louvres (some 17 feet in depth) have been fitted throughout the whole length. On the east side of the house is a central arcade composed of an iron framework (seen with particular clearness in fig. 2), which will not be filled in, but forms part of the general scheme of ventilation. The term "central" arcade at



Section through the Retort-House.

once needs explanation, in order to avoid perplexity. The house, as it at present stands, and as it is seen in the photographs, simply forms half (to the middle of the arcade) of the house as it will ultimately be when completed; and the second half will be, it is intended, an exact duplicate of the first. The arcade will then be central between the two halves, and will remain, as in the case of its prototype, open to the heavens. This central arcade is 20 feet across; and both the charging-floors—the hottest part of any inclined retort house—will, when the house is completed, back on to this open space, and so the temperature can never rise to a distressing degree. So far, we have seen that, in the structure, ventilation is arranged for by means of the bays in the west wall, by the large range of louvres above, and by this open arcade on the opposite side of the house, and then there is a clear 5-feet opening in the roof the full length of the house precisely above the ascension-pipes. The whole aim of this method of construction is to get a clean sweep of upward ventilation right through the house; and it is very successful.

The building is 120 feet long, and 45 feet from the west wall to the central arcade. This, as stated, is 20 feet across, and then beyond that the second half of the house will eventually occupy a further 45 feet. So that, when the scheme for the house is finished, it will form a handsome structure 120 feet by (including the arcade) 110 feet. The height of the end walls is 63 feet.

This brings us to the roof; and a fine view of the exterior

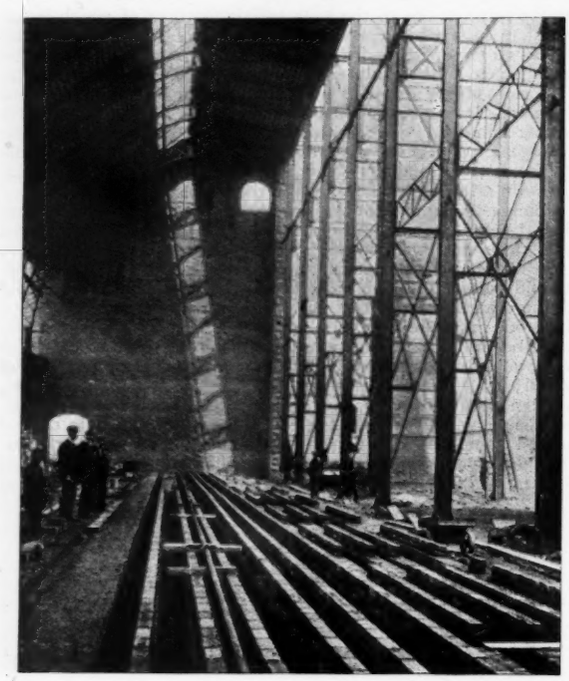


FIG. 2.—FOUNDATIONS FOR THE RETORT-BENCH: A GOOD VIEW OF THE ARCADE.

construction is given in fig. 1, and of the interior construction in fig. 9. The main principals, of which there are nine in the completed half of the house, are rather more than a quadrant in form. They are supported on bed-stones on the top of the west wall, and connect on the other side to the inner uprights of the central arcade. These principals have an outside measurement of 70 feet, an inside measurement of 66 feet, and a radius of 38 ft. 3 in. They are 2 ft. 6 in. deep; are built up of 3½ in. by 3½ in. by ½ in. angles and 2½ in. by ½ in. flat bracing, and ⅜ inch thick web plates, and are joined together by cross lattice girders, of similar design. Above and between these main principals are (in all) eighteen secondary principals, 8 in. by 4 in. rolled steel joists, supported on four main purlins. The whole roof, excepting the 5 feet wide ventilating opening the entire length, is covered by Duchess slates, secured by lead nails to angle-iron slate lathes. The roof is of a light and attractive design; and the only difference between it and the one at Mariendorf is that the latter is trussed and not latticed, as is that at Plymouth—the design here adopted being more suitable for existing conditions.

The central arcade (fig. 2) is built up of eighteen uprights 62 feet high, of 14 in. by 6 in. rolled steel joists. They are connected at the tops, both longitudinally and crosswise, by 10 in. by 6 in. rolled steel joists. In the finished part, these joists are built into the end walls. The overhead coal-hoppers are supported from the central arcade by rolled steel joists resting, at the other end, on the buckstays of the bench. At the point of this support, the framework of the arcade is strengthened by strong lattice girders, 4 feet deep. There is also a channel girder fixed across it at the height of the charging-floor. The whole of the arcade uprights are braced together by flat steel ties, and the bottom parts are both braced and trussed, with flat iron ties and angle-iron struts. Longitudinally on each side under the charging-stage a lattice girder runs the full length of the house.

Leaving the house structure, we have now to deal with the settings, of which some striking views were taken during erection (figs. 2 to 6). The main division-walls are built of Stourbridge fire-bricks; but the chief feature about the Didier settings is (without particularizing the system of construction) not only the quality of material used, but the complete use made in the composition of the interior work of specially moulded fire-clay blocks for every position; so that there is really very little brickwork used in the structure. This results in a fewness of joints when compared with settings built entirely of fire-bricks, and all chipping and consequent injury is avoided. The furnaces are unusually deep, being some 3 feet deeper than the ordinary English setting; and special arrangements are made to prevent any cold air getting into the settings during clinkering or charging operations. The heating of the secondary air is very simple and effective; the bottom waste-gas flue being completely black. The tiles of which these flues are made are rabbeted into each other, in order to prevent any bye-passing of either the gases or the air supply. Another feature is that the furnaces are supplied by steam from a boiler situated in the flue at the back of each setting. These are plain, wrought-iron boilers, heated by the waste gases; and the steam from them passes from the back to the front of the setting, and enters on each side of the ash-pan with the primary air, so that a continuous current of steam is blown along the whole length. It is Mr. Hoyte's experience that, owing to the even distribution of the steam, and the constant light pressure, he gets out the clinker in a softer and smaller form from back to front of the furnace than by the usual means. Such regularity as is experienced here in this respect is not to be obtained by a hand-operated valve. Then above the boiler is a door-way leading into a chamber at the back of the setting, where the dampers conveying the generator gases to the various parts of the setting are regulated. The bracing of the settings is composed of 15 in. by 6 in. vertical joists and 2¼-inch tie-bars. In fig. 2 will be seen two of the bottom tie-rods, one in position, and the other ready for lowering. The chimneys, of which there are two, are situated in the central arcade. Their height is 75 feet; and they are carried up the whole distance with the same inside section—4 feet square. Provision has been made in these chimneys for the second half of the house.

The bench in this first half of the house consists of eight beds of nine retorts each, 20 feet long, by 23½ in. by 15½ inch parallel, and of the oval-⏢ form; and, as already stated, they are capable of producing 1⅓ million cubic feet of gas per day. The retorts are made of special Stettin material, capable of standing a working temperature of 3500° Fahr., and are glazed inside with a material which will stand even a higher temperature.

Regarding the bench-fittings, the ascension-pipes are 7 inches in diameter; and above the mouthpieces, they are each provided with an expansion joint. About two-thirds of the way up are self-sealing cleaning-out doors, as well as on the top of the bridge-pipes (fig. 7). These doors, which fasten in the same way as retort mouthpieces, are the invention of Mr. Drory, as is also the form of the hydraulic mains and valves, which, unlike English settings, are placed on a level with the higher part of the setting, instead of close to it at the lower part (figs. 8 and 9). The hydraulic mains are also fitted with cleaning-out doors, and with an internal division-plate passing down in a slanting direction the whole length, and sealed at the bottom; so that, through the cleaning-out doors, any obstructive tar can be removed without discomfort, while gas making is proceeding. Adjusting screws are provided for the levelling of the mains in the event of any sinking of the bench occurring. The gas and tar are taken off together; and from the foul main, the former passes on to a set of annular condensers at the south end of the house. These consist of six annular tubes; the outer tubes being 4 feet in diameter and the inner ones 3 ft. 2 in. Their height is 40 feet. There is a disc valve at both ends; and the connections and valves (with bye-pass arranged) are 20 inches in diameter. The condensers are also furnished

FIG. 3.—RETORT-ARCHES IN COURSE OF CONSTRUCTION.

with butterfly valves regulating the flow of air up the inner tube. The tubes stand on granite bases.

While inspecting the superstructure of the bench, one is impressed with the evidence that abounds everywhere of the amplitude of the provision that has been made for giving attention, with a minimum of trouble, to the upper part of the equipment of the house. There are the cleaning-out doors on the ascension and bridge pipes and on the hydraulic mains, all of which can be instantly opened by hand. Then along the front of the ascensions is fixed a platform 2 ft. 6 in wide; and, reached by a spiral staircase from the discharging-floor, every part of this upper work of the bench is readily accessible. In fact, from ground-floor to coal-hoppers the whole house can be walked over, without any climbing of vertical, or almost vertical, ladders.

A few words, before touching the coal plant, as to the discharging and charging floors. The former is of good area, being some 20 feet wide (fig. 10). The framework is of rolled steel joists, 10 in. by 6 in., supported on eighteen cast-iron columns, about 13 feet long. The floor itself is composed of coke-breeze concrete arches, paved with Staffordshire blue brick. It is reached from the ground floor by a stairway situated by the wall almost midway in the length of the house. The charging-floor can be reached from the discharging-stage at either end of the house by iron stairways. This floor is unique among inclined retort-house charging-stages in this country. As already stated, it is open completely to the central arcade, with the exception of a temporary row of galvanized iron sheets placed obliquely to protect the men from the rain; but these will not be needed when the second part of the house is built. This openness of the stage renders unnecessary any great width; and, as a matter of fact, from the hand-rail to the front of the bench it is only some 11 feet wide. Here again we find a departure from English construction. In installations hitherto, the charging-stages are supplied with a movable platform on wheels for the men to examine, or give attention to, the top line of retorts. In this case, the stage is a double one (see fig. 11); the upper floor (which is only 7 ft. 6 in. wide) being some 2 ft. 6 in. above the lower one, or just about level with the tops of the bottom retorts. It is on the former that the whole of the work is done; and from it one can see into all three ranges of retorts. The space between the platform and the front of the setting is about 3 ft. 6 in.; and the draught which is set up between the platform and floor causes the smoke and gases issuing from the retorts during charging to be taken up in a vertical direction, instead of being blown out on to the men. The retorts are fed by measuring chambers on the shot-pouch principle, with levers top and bottom, and the usual set of travelling shoots. It will be a point of interest to mention that the bottom lever has been set in somewhat, so that the man charging is close to the retorts, and can keep an eye on what is going on in them, and so is able to better regulate the charges.

Fig. 4.—Back View of Arches through the Arcade.

In inspecting the coal plant, it is found at the outset that the Company suffer one disadvantage in respect of their coal supply. The coal used is all seaborne; and it has to be carted from the wharf to the works—a distance of some 500 or 600 yards. The coal comes in shiploads at fairly regular intervals, but with pauses between. It is therefore necessary to arrange a store to take up the surplus amount supplied while the ship is unloading, so as to supply the retort-house between the times when no ships are in the harbour. From the carts the coal is dumped into an underground hopper (capable of holding two or three cart-loads of coal) situated at one end of the coal-store, which, as stated early in the article, was formerly No. 4 retort-house. It is 120 feet long by about 60 feet wide. Underneath the hopper, there is arranged a slide for shutting off the supply to the breaker and elevator when required; and this slide is worked by means of a shaft placed in a convenient position on the floor-level. After passing through the mouth of the hopper, the coal enters a single-pair-claw breaker, capable of passing from 40 to 50 tons of coal per hour. After going through the breaker, the coal falls into the boot of an elevator, which raises it to the level of the tie-rods of the roof of the coal-store, and there delivers it on to a travelling band conveyor 2 ft. 6 in. wide (fig. 12). This band conveyor is supported overhead on lattice standards in the coal-store throughout its length; and a travelling throw-off carriage is arranged on the frame of the

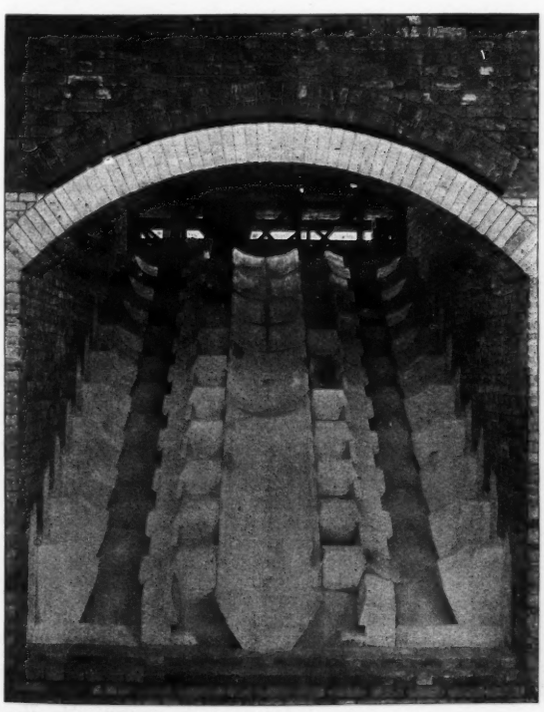


Fig. 5.—One of the Settings, showing the Fire-Clay Block Work.

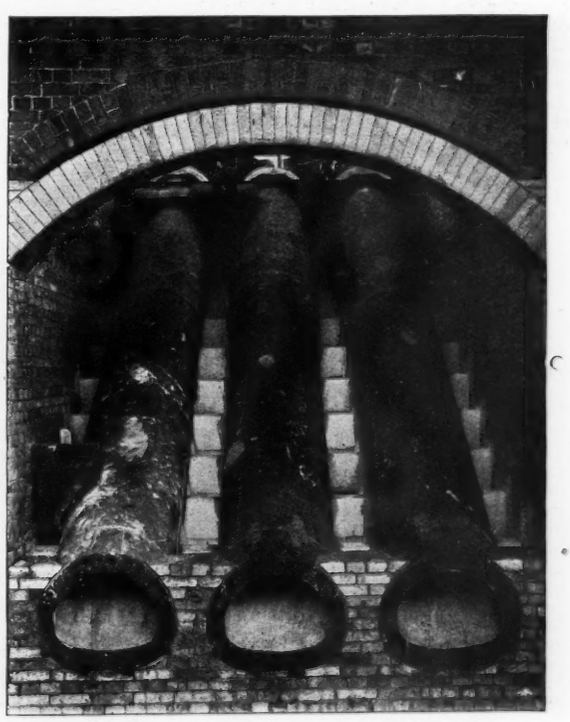


Fig. 6.—Three Bottom Retorts in One of the Settings, with the Special Blocks Between.

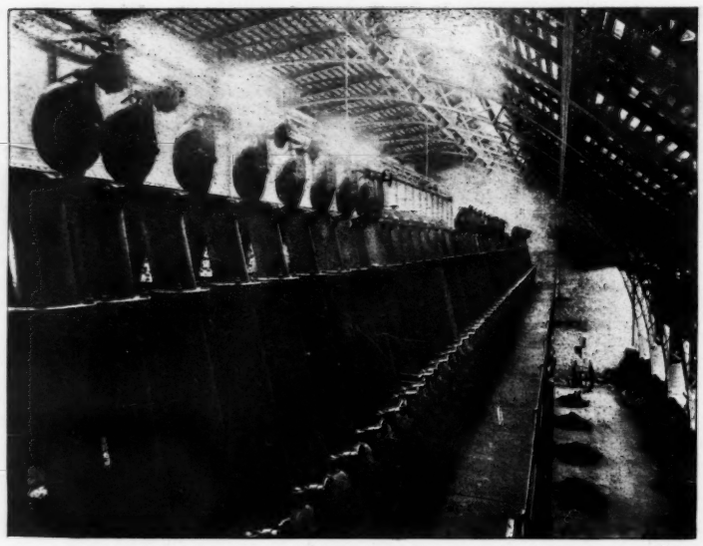


FIG. 7.—CLEANING-OUT DOORS ON THE ASCENSION AND BRIDGE-PIPES, WITH PLATFORM IN FRONT OF THE ASCENSIONS.

conveyor by which the coal can be thrown off at any desired part of the store, which, in this way, can be filled to the level of the bottom of the conveyor without trimming or other attention. For taking the coal out of store, a second band conveyor has been arranged in a tunnel covered with steel plates close to the floor of the store; the tunnel being provided with suitable doors and shoots inside to feed the coal on to the 2 ft. 6 in. band. By this band, the coal is delivered to the boot of the elevator leading to the retort-house plant. This consists of the elevator (fig. 13), which is cased in, and is about 85 feet centres, arranged at an angle across a roadway between the coal-store and the retort-house; the elevator being of such a length as to enable the coal to be delivered to the push-plate conveyor which passes over the continuous hopper above the charging-stage. The elevator is fitted with 12-inch buckets, and is capable of elevating from 20 to 30 tons of coal per hour. The conveyor is of the latest push-plate design, with the chain and push-plates supported on rollers running on the frame of the conveyor, so that very little noise is made by the conveyor in working. The continuous hopper is of 140 tons capacity, which is about equal to the requirement of 24 hours' work; and it can be replenished easily in nine hours by the coal plant just referred to. In a room adjoining the coal-store is found a 22-horse power "National" gas-engine, which drives the ground conveyor, the elevator to the retort-house, and the push-plate conveyor over the storage hopper. In this room, too, is seen a small engine and dynamo, with accumulators and battery of 55 cells, for the lighting of the purifying-house, which has yet to be described. At the further end of the coal-store is a second gas-engine of like horse power for driving the coal-breaker, the main elevator, and the distributing conveyor.

One other part of the retort-house equipment yet remains to be dealt with, and that is the coke plant. A De Brouwer (2 ft. 6 in. wide) conveyor has been adopted (fig. 10); and the mere mention of the name is sufficient description. From the house, the conveyor inclines upwards in the yard, and delivers into coke-hoppers of 160 tons capacity (fig. 14), which is about equal to two days' production, and so tides the work over Sundays. In its delivery to the hoppers, the coke falls on to diagonally fixed bar screens, through which the breeze drops; the coke being carried by a conveyor without further separation into sizes, into the other hoppers—there being no sale for assorted coke at Plymouth. The hopper conveyor is fitted with doors over each hopper, so that the coke can be placed in any one as desired. From each outlet of the hoppers, the coke falls on to another inclined screen, from which it is bagged. The whole plant is driven by a gas-engine arranged below the floor of the retort-house. The quenching of the coke is commenced by rose-headed

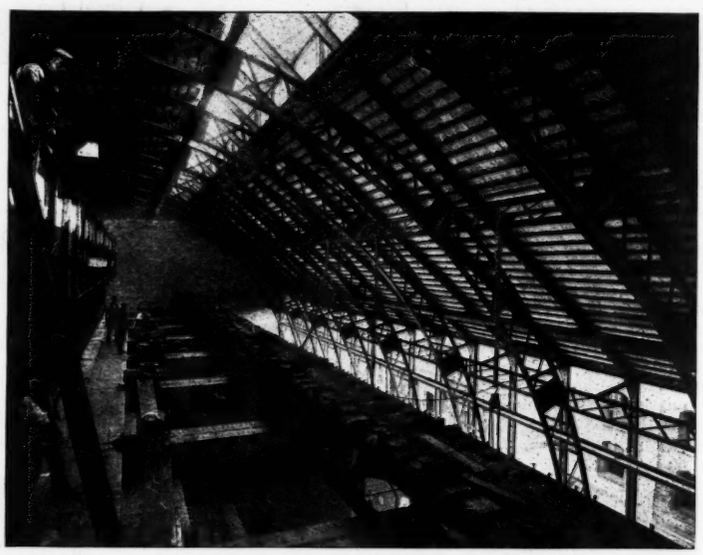


FIG. 8.—SUPERSTRUCTURE OF THE BENCH IN COURSE OF CONSTRUCTION. A GOOD VIEW OF THE ROOF WORK.

FIG. 9.—ON TOP OF THE BENCH, SHOWING THE ARRANGEMENT OF HYDRAULIC MAIN, PIPE WORK, AND DRORY'S CLEANING-OUT DOORS.

sprinklers fixed to the buckstays, and further in the usual manner (which forms a feature of the De Brouwer patent) at the bend where the coke passes from the horizontal to the inclined portion of the conveyor. A noticeable feature of this end of the conveyor is the tunnel-shaped steam chimney for carrying the steam from the quenching place (which is inside the retort-house) some distance up the slope outside, so as to keep the retort-house as free as possible from steam, but more particularly to assist the thorough quenching of the coke. The steam passing through the inclined tunnel appears to keep all air from the coke, and puts out the flame perfectly without requiring the coke to be so saturated with moisture as to be in any way damaged. Another feature of this method of quenching the coke lies in the fact that the steam-quenched coke leaves the conveyor at a high temperature, and has sufficient heat in it to evaporate any moisture which may be in the pores of the coke; the resulting sample of coke being clean and silvery to the eye, and satisfactory from all points of view. We are informed that the improvement made in the De Brouwer conveyor since its introduction in England has brought the production of breeze down to a very slight point, and that this result has been accomplished by great care in handling the coke after it leaves the conveyor. Mr. Hoyte regards as very moderate the amount of breeze that is produced at Plymouth.

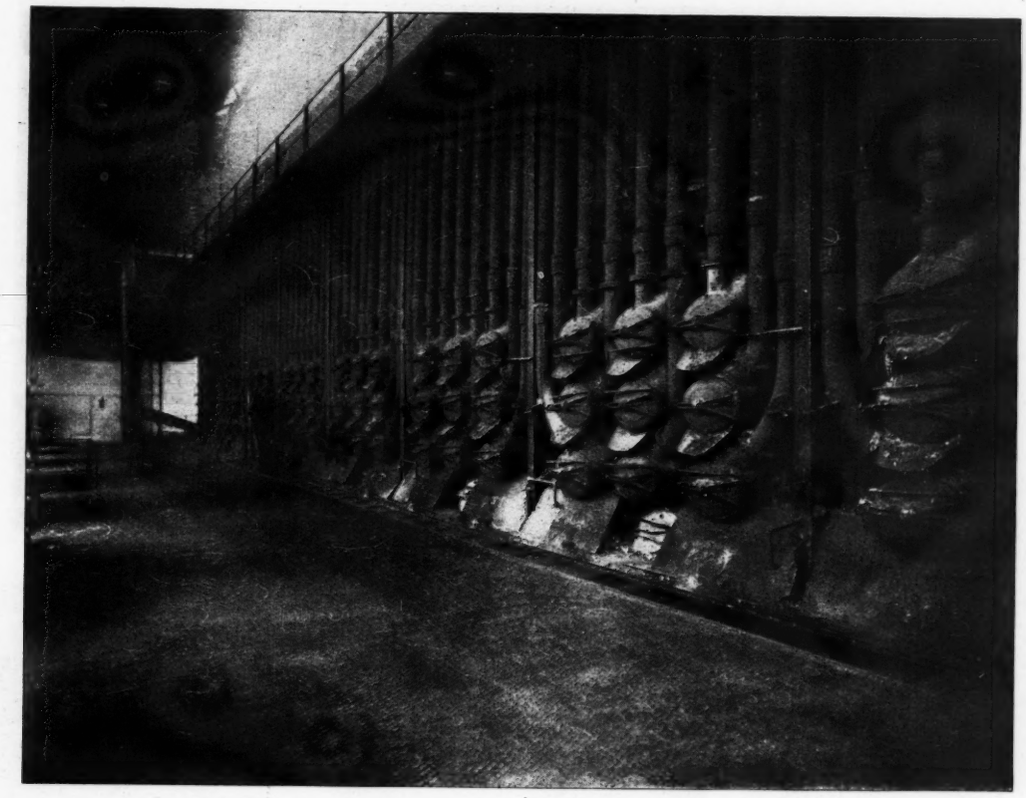


FIG. 10.—THE DISCHARGING-FLOOR, SHOWING ALSO THE DE BROUWER CONVEYOR.

This completes the description of this interesting retort-house; but we cannot leave it without a few complimentary words as to the character of the work. From base to roof, and all that there is within and outside the house but connected with it, constitute in the whole a piece of work of which all associated with it in any way may be proud; and not only they but the Company who are now the possessors. The house has not yet been in operation a clear two months; and therefore it is too early to speak of working results. But it is an interesting item of intelligence, which we have Mr. Hoyte's permission to publish, that already they are carbonizing in this house at under 1s. per ton of coal including everything—from the taking of the coal out of store, the men on the drawing and charging stages, and the coke and exhauster men. There are two men on the charging-stage and two on the discharging-stage, working eight-hour shifts. This is good, remembering that there are 72 retorts, that the charges

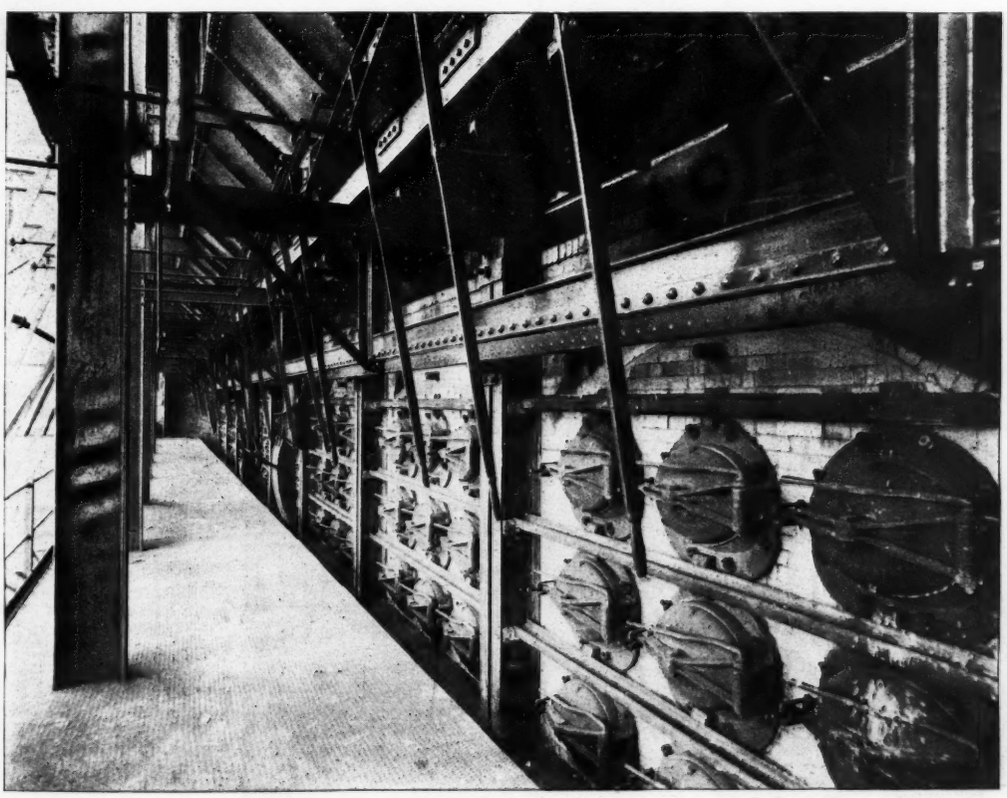


FIG. 11.—THE CHARGING-FLOOR, SHOWING THE DOUBLE STAGE.

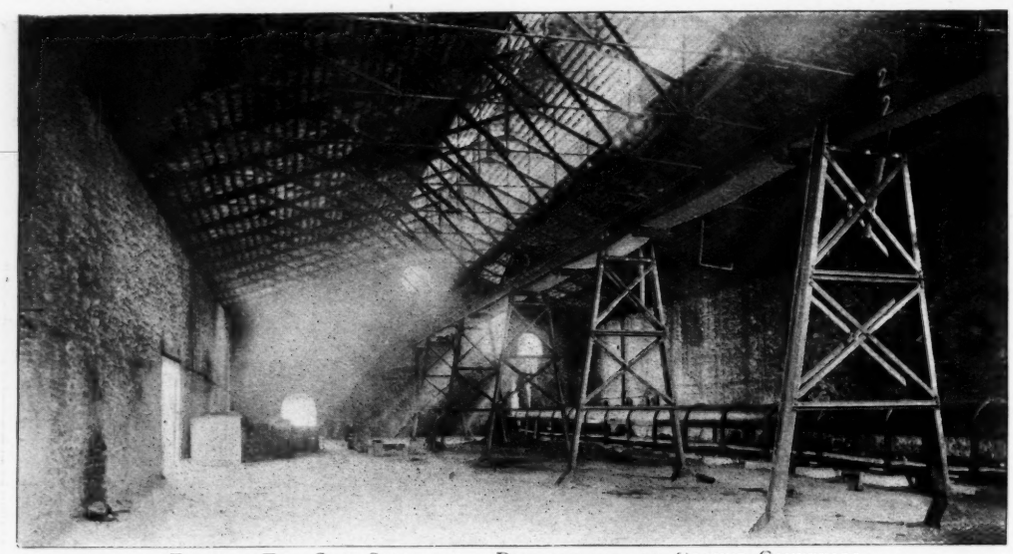


FIG. 12.—THE COAL-STORE, WITH DISTRIBUTING AND GROUND CONVEYORS.

are five-hour ones, with 7 cwt. to the charge, and that less than two months ago the men had only been at work on horizontal settings. Considering this, they are doing remarkably well on the inclines; and, in a short time now, it is apparent all little roughness of movement caused by the change of work will have worn off, and greater alertness will almost unconsciously ensue. As to the working of the retorts, Mr. Hoyte states that they started off with the minimum of hitches, and that though they have only been in use for a few weeks, the results have come quite up to the expectations that his Chairman and Board and himself anticipated after what they saw at Mariendorf. The charges in the retorts were observed, on the occasion of our visit, to be as level as charge was ever laid in a retort; and several of the spent ones were seen to tumble out of the retorts in a perfect mass, after the release of a few inches of the charge lying near the mouthpiece. The coals that are now used at Plymouth, it may be of interest to the reader to know, are Peareth, Dean's Primrose, and Townley Main. Another point that cannot fail to impress the visitor is the remarkable rapidity with which, during the drawing and charging, the smoke and steam pass away directly upwards, which is the proof of the efficiency of the special construction of the house with the view of securing as near perfection in its ventilation as the circumstances will allow.

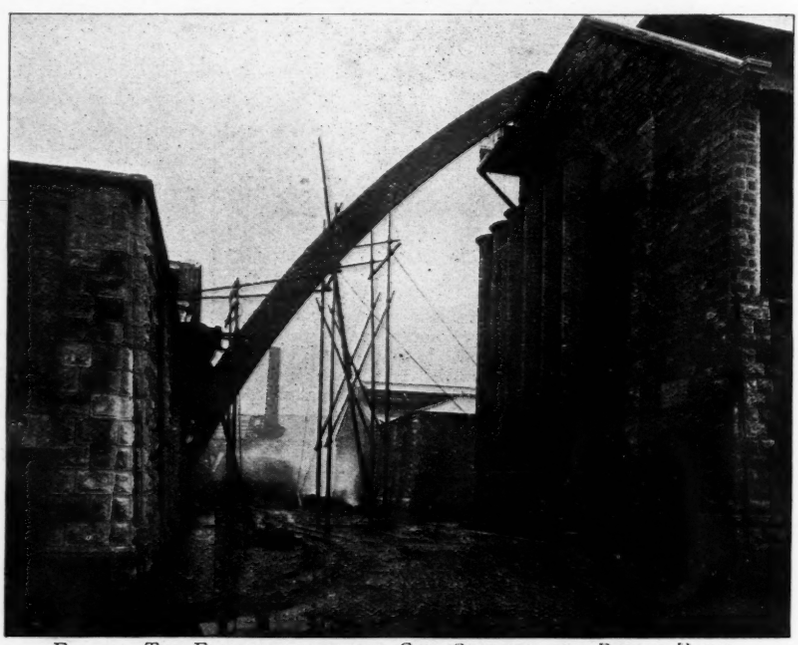


FIG. 13.—THE ELEVATOR FROM THE COAL-STORE TO THE RETORT-HOUSE.

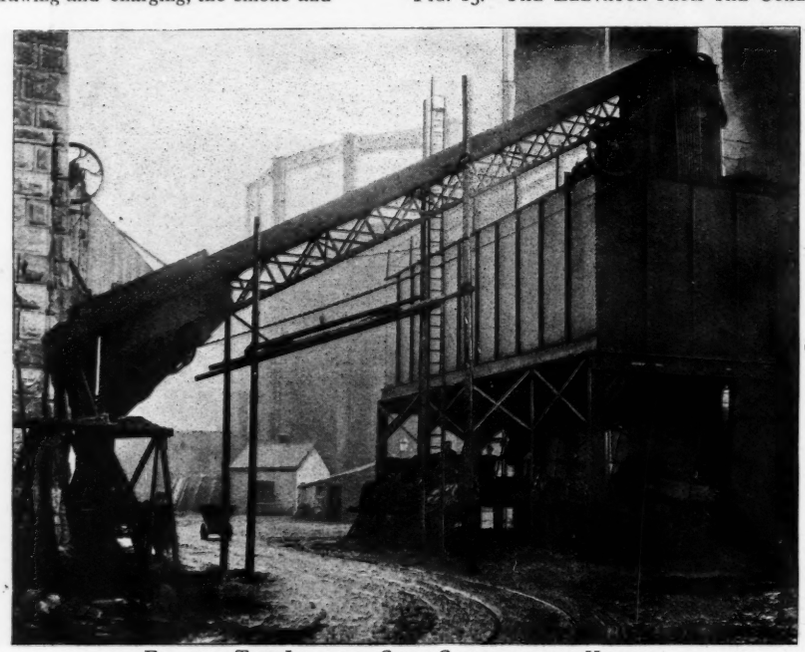
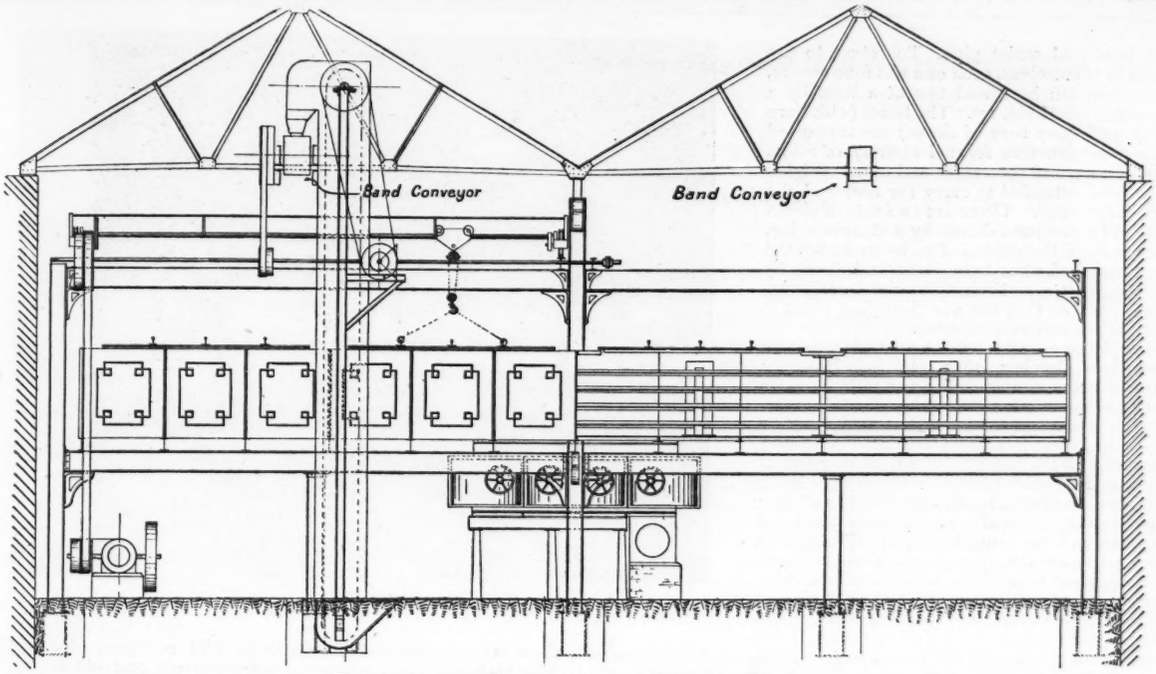


FIG. 14.—THE INCLINED COKE CONVEYOR AND HOPPERS.

EXHAUSTERS, &C., AND WATER-GAS COKE PLANT.

There are a few additional portions of plant which claim notice. It was mentioned, when generally outlining this scheme of works improvement and extension, that the old No. 3 retort-house has been converted into an exhauster and washer and cyanide plant house. At one end of the building, in connection with the new inclined retort house, there have been installed a duplicate set of exhausters, of 70,000 cubic feet per hour each; and space is left for a further two sets for dealing with the second half of the house when necessity demands its erection. There is also a new Livesey washer near by, of a capacity of 1½ million cubic feet; and provision has been made alongside for an additional one for the next installation of inclines. As soon as things settle down, the house is to be partitioned, so as to separate the cyanide plant from the new machinery; and the



ELEVATION AND SECTION OF THE PURIFIER-HOUSE.

portion allotted to the latter is to be tiled, and put into the respectable condition in which one expects to see such rooms. A new station meter of 125,000 cubic feet per hour capacity (dealing with the whole of the coal gas plant) has found a temporary habitation in a shed. Future work embraces the clearing away of an old small holder, known as No. 3; and on the site is to be built a new governor and meter house. The governors at the present time are dotted about the works; and the proposed new house will permit of their collection and manipulation under one roof.

In connection with the Cutler carburetted water-gas plant (which consists of four sets of 750,000 cubic feet each), an introduction is being made which will effect economy in the handling of material. At the present time, the generators are fed by coke brought from the retort-house in bogies, holding about 5 cwt. each; and these have to be raised by a hydraulic lift to the operating-floor. The plant that is now being put in will simply involve the carrying of the coke in bulk from the yard coke-hoppers, and shooting it into a hopper outside the water-gas house. From there, it will be raised by a De Brouwer conveyor (set at an incline of about 40°, and of 20 tons an hour capacity), which will deliver on to a cross conveyor inside the house; and this, in turn, will feed the coke into four hoppers of 12 tons capacity, situated over the generators.

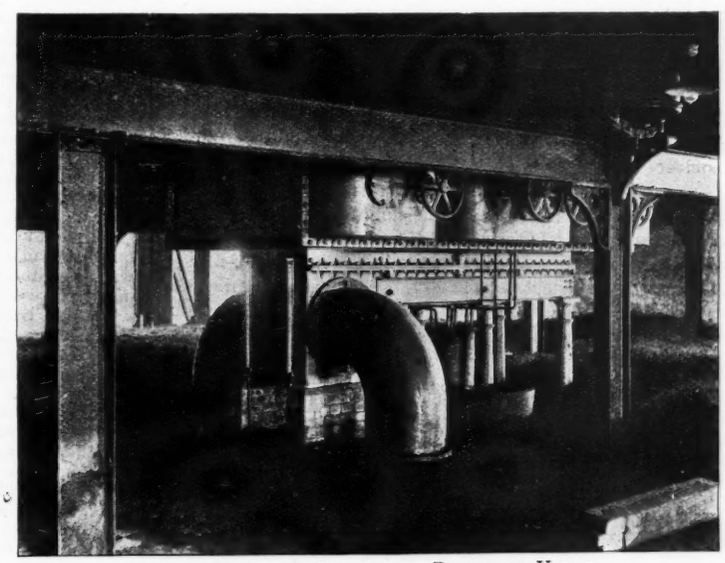


FIG. 15.—PURIFIER-HOUSE, AND PICKERING VALVE.

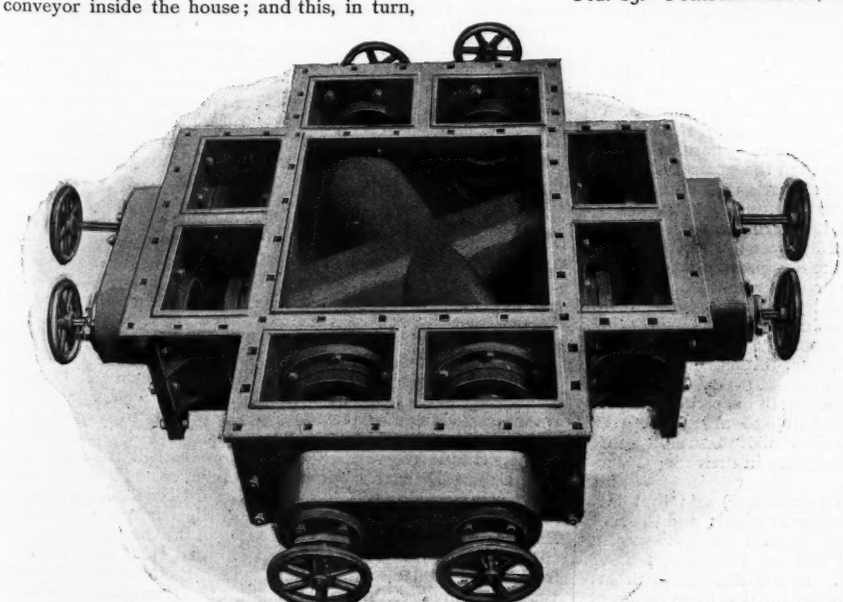


FIG. 16.—INTERIOR VIEW OF A PICKERING VALVE

THE NEW PURIFYING PLANT.

We have now come to the last, but not the least important, of the extensions embraced within the scheme under notice. This is the new purifying plant for the carburetted water gas; the old water-gas purifiers, in the changes made, having been allocated to the new inclined retort house. The set of four new boxes have been installed in the building adjoining those in which the old ones are situated. They are 30 ft. by 35 ft. by 5 ft. deep, and of the luteless type, worked by a 24-inch Pickering valve (figs. 15 and 16). This valve is the largest of the kind that has been made up to the present. It works without any connections; being simply bolted to the bottom of the purifiers. Any combination of boxes can be worked by in it rotation; and Mr. Hoyte testifies that it is very simple in its operation. To this valve there is only

one inlet and outlet pipe. To return to the purifiers themselves, each one has four covers, and these can be raised two at a time by a travelling crane (fig. 17). The boxes (which are fitted with four tiers of sieves) are supported on a superstructure formed entirely of rolled steel joists; and the centre and outer uprights have been extended to carry the roof and the travelling crane. There are two sets of elevators and conveyors, driven by a steam-engine, for handling the oxide. The house is lighted by a small electric light plant laid down by the Contractors. From this brief description, it will be seen that the new purifying plant is of a very complete character.

The large scheme here described was only started in October, 1902. In July last, the purifiers were in operation; and in little more than twelve months the entire plant—excepting the coke plant for the water-gas generators—was in full use. Considering the very heavy character of the work involved, more particularly in the retort-house, excellent expedition has been displayed by Messrs. Willey and Co.; and the work generally as finished cannot fail to command the approbation of all engineers who may have the opportunity of inspecting it. It is apparent from the work put into the Didier-Stettiner settings that, in point of strength and quality of material, it is the intention of the firm that they shall be second to none. Time must, from results, tell the tale of their working; but the present experience has given great satisfaction to the Chairman and Directors and the Engineer at Plymouth, and it will doubtless be found that their confidence has not been misplaced.

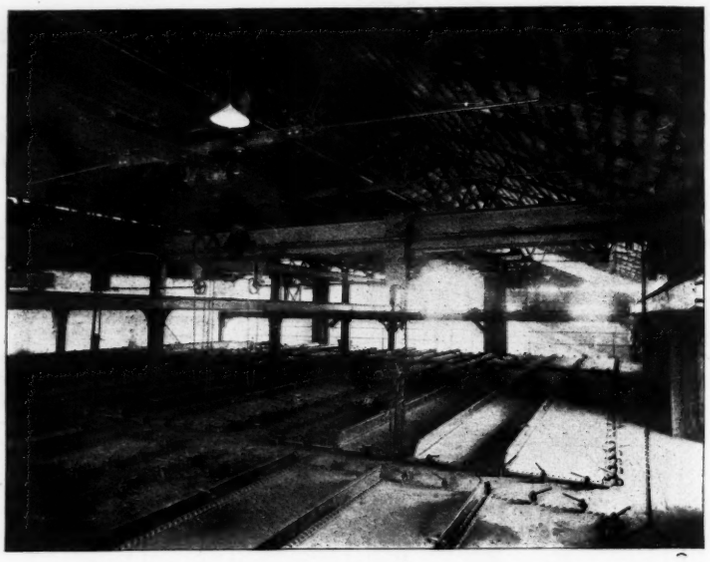


FIG. 17.—PURIFIERS, SHOWING THE CONVEYOR AND TRAVELLING CRANE.

PRESENTATION TO MR. MARSHALL.

A farewell dinner to Mr. and Mrs. F. D. Marshall was given by the officers and employees of the Danish Gas Company in Copenhagen on the occasion of their departure for England, and the opportunity was taken to present a suitably-engraved watch to Mr. Marshall. The officers and staff and representatives of the employees of the Company assembled to the number of fifty or so, at the "Skydebane," Copenhagen, on Thursday evening, the 7th inst. The dinner was presided over by Mr. JOHN CRIDLAND, the Company's General Manager and Secretary in Denmark.

In a beautiful and touching speech, Mr. Cridland referred to Mr. Marshall's past—alluding at the outset to the first evening they met—nearly 23 years ago. The friendship then immediately established had lasted without interruption until now. They had worked side by side; and each day had knitted them more firmly together. Mr. Marshall's departure was to him a great personal loss. He proceeded to allude to the first visits they made together to the Company's towns, and to the keen interest shown by Mr. Marshall, not only in the Company's affairs, but likewise in the customs and concerns of the Company generally, and how by this interest he gained at once many and lasting friends among the Danes. They had often had long and weary negotiations with refractory communes and town councils; but by his good humour, sympathetic manner, and loyal conduct, Mr. Marshall had helped so much to further the Company's interests, that in the long run they always gained their ends, to the welfare of the Company and the renewal of the concessions. The work Mr. Marshall had accomplished in Denmark would always stand as a monument to his name and enterprise. The beautiful Frederiksberg works were regarded, even on the Continent—where beautiful and modern works were the rule, rather than the exception—as a model; and were visited by engineers of all nations. There were also the Strandvei works and the remarkable enterprise connected with them; the new Viborg works; and, lastly, the new and elegant Aalborg works—all the admiration of everyone who had seen them, and a standing credit both to the designer and the Company. He was sure there was not one present who did not regard Mr. Marshall's departure as a personal loss—the loss not only of a master but of a friend; and they would extend this feeling, he was sure, to Mrs. Marshall. They should also not forget the great honour shown to Mr. Marshall, and, through him, to the Danish Gas Company, by his election to the presidency of the Institution of Gas Engineers. This incident of his career showed that, expatriated as he was, Mr. Marshall had always kept in touch with his British colleagues; and the visit of these colleagues to Denmark a few years since was ever green in their memory as a pleasing reminiscence.

Mr. Alfred Edwards (Mr. Marshall's successor) said that Mr. Marshall had been his immediate chief for 22 years; and to serve him had been a work of love. In his original ideas, he was in advance of his times. Mr. Marshall had set him many lessons of foresight and calmness of action. In his dealings with his managers and men in the works, he never hustled them or swept down full of grievances at trifles, but always in trouble helped them by his forethought, courtesy, and coolness. He wished Mr. Marshall always to keep old Denmark and old friends in mind; and to ensure this they begged his acceptance of a chronometer watch. They did not wish either that Mrs. Marshall should forget them; and so they begged her acceptance of a silver-mounted dressing case, the keys of which were hanging from a bouquet of roses, with the national colours—ribbons of red, white, and blue.

At the same time Mr. Edwards unveiled a beautifully illuminated address, surrounded by water colours of views from the towns lighted by the Company. At the back of the address is a pocket containing a parchment with the names (some 800 or 900) of the subscribers—all officers and men of the Company.

Mr. Marshall, in replying, said both Mrs. Marshall and himself were deeply touched at the beautiful gifts; but especially at the gathering to do him honour. Twenty-two years was a good slice out of a man's life; but these had been spent in promoting the welfare of the Company. Without, however, the cordial support of the officers and men, it would have been impossible to achieve what had been done. His first thoughts were always for the Company; and, secondly, for the welfare of the staff and employees. They must not, however, thank him only, but principally the Directors in London; and, secondly, his dear friend and colleague, Mr. Cridland. Many present were with him at the commencement of his career in Denmark; and it said much for the feelings of almost brotherly friendship between them that they had stuck together so long. Strikes were unknown among them, and disagreements and disputes had never entered into their calculations; and be begged them to accord his successor, Mr. Edwards, the same loyalty and support that had been accorded him. When recommending Mr. Edwards to the Board as his successor, he was not actuated merely by feelings of friendship, but because he felt he was the right man in the right place. Mr. Edwards had managed the Frederiksberg works in such a manner as to win the respect of all; and they would find him a good and humane engineer. Mr. Marshall reminded his audience that this was the fiftieth anniversary of the foundation of the Danish Gas Company. It was a grand Company, ably administered by a splendid Chairman (Mr. Corbet Woodall) and body of Directors, and a loyal body of officers and men; and it was a pleasure and honour almost beyond expression that he felt that he was still united to the Company. He most sincerely trusted that for years to come he would be in a position to visit his old friends and his old works from time to time.

The inscription on the watch was as follows: "To Frederick Deacon Marshall, as a token of affectionate esteem from the officers and workmen of the Danish Gas Company, 1881-1903."

Opposition to Private Bills.—The time expired on Saturday for depositing memorials alleging non-compliance with the Standing Orders in respect of the petitions for Private Bills for the ensuing session. In connection with Bills in which our readers are interested, memorials have been deposited in respect of the Arlesey Gas Bill, from the First Garden City, Limited, and Francis Childe Warren; the Aylesbury Gas Bill, from the Aylesbury Urban District Council and others; the Barnard Castle Urban District Gas Bill, from the Barnard Castle Gas Company; the Belfast and North-East of Ireland Electricity and Power Gas Bill, from the Corporation of Belfast; and the Cheshire Electricity and Power Gas Bill, from Edward Howard Moss and others, and from W. T. Bilson and others. The Examiners commenced yesterday their sittings to take proof of compliance with the Standing Orders.

OBITUARY.

The death took place last Wednesday, of Alderman THOMAS ISHERWOOD, J.P., D.C.L., &c., Principal of Southport University School, and ex-Mayor of the borough. Deceased had been Chairman of the Gas Committee and of the Health and Library Committees of the Corporation; and during his mayoralty in 1901, his chief legislative work was the promotion of the Bill which secured for Southport, with Birkdale and West Lancashire, the control of the water undertaking, at a cost of £840,000. He was a Fellow of the Royal Society of Edinburgh and also of the Chemical Society; and he had made a scientific study of gas making. As Chairman of the Gas Committee, he advocated mechanical stoking, claiming that the Corporation could save by this method at least £1500 a year. He had resided in Southport for twenty years, having removed to that town from Blackburn. He leaves a widow, son, and daughter.

Masonic.—Last Tuesday, Bro. Robert G. Shadbolt, the Engineer and Manager of the Grantham Gas-Works, was installed W. M. of the Doric Lodge, No. 362, in the presence of a number of distinguished visitors (representing sixteen different Provinces, besides London), including the Secretary of the Royal Masonic Institution for Boys. Bro. William A. Surridge, of No. 21, John Street, Adelphi, has accepted the office of Steward for the Royal Masonic Benevolent Institution, as representative of the Evening Star Lodge, No. 1719.

Institution of Civil Engineers.—Among the associate members of the Institution who have lately been transferred to the class of members are: Mr. Alex. Dougall, jun., of Tunbridge Wells; Mr. J. Gibson Newbigging, of Manchester; Mr. H. Woodall, of Messrs. Corbet Woodall and Son, Westminster; and Mr. J. W. Bradley, the City Engineer of Westminster. At the monthly ballot last Tuesday, Mr. H. A. Hardcastle, in the Engineer's Office of the Newcastle and Gateshead Water Company, and Mr. S. G. Williams, in the office of the New River Company, were elected as associate members.

Lowe Crude Oil Water Gas.—Mr. L. P. Lowe, the Manager of the California Light and Fuel Company, states that almost fifty Pacific Coast towns and cities are now supplied with gas manufactured by the Lowe crude oil water-gas system, in which crude oil and steam only are used. The majority of these plants have been installed within the past three years. Only one works in California (and that a small and unimportant one) at present manufactures coal gas exclusively. The average selling price of gas there is said to be lower than in any other State in the Union, in spite of the fact that most commodities cost more on the Pacific Coast than elsewhere in America. There is, however, of course, an abundant supply of low-priced native oil available, which has rendered this result possible.

Trade Disputes Last Year.—According to the "Labour Gazette," greater freedom from industrial disputes was experienced in 1903 than in any of the previous ten years. During the twelve months, 360 disputes began, affecting 113,873 workpeople; while the total time lost in disputes was 2,316,792 working days. The average annual duration of disputes in the period 1893-1902 was 8,839,347 working days; and the average annual numbers of disputes and of workpeople affected were 724 and 271,000 respectively. Questions of remuneration were the most frequent causes of disputes. The number which arose under this head was 214, involving 52 per cent. of all the workpeople directly affected by the disputes of the year. Refusals to work with non-Unionists, and other questions concerning Trade Unions, were responsible for 25 disputes, directly involving 17,602 workpeople; while 54 disputes, involving 13,471 workpeople, arose out of questions of working arrangements. As regards the results of the disputes, it is found that 83, directly affecting 28,241 persons, terminated in favour of the workpeople; 156, directly involving 25,699 persons, in favour of the employers; while 92, directly affecting 17,380 persons, were compromised.

Cost of Electric Light for a Large Office Building in New York.—The following particulars are given in the "Engineering Record," on the authority of Mr. J. D. Wilson, of the cost of the electric lighting service of a large office building in New York, in which everything of the kind is done on the premises. This particular item of the working expenses was arrived at in the following manner: From a 20-hour test during a winter's day, the output of the electric plant was found to be 576·9 kilowatt-hours; the average load being 258·4 amperes at 112 volts. By allowing 8 lbs. of coal per kilowatt-hour, the coal consumption chargeable to light was 2·31 tons. This was taken as the average daily winter consumption for the purpose, over six months; the summer daily consumption being taken at 40 per cent. less. The price of coal was $2·77 per ton. Adding to this the proportionate costs and charges of all kinds, including lamp maintenance and renewals, made the gross running cost about £800. This was for 1667 lamps of 16-candle power equivalent; so that the cost for these was about 10s. each per annum, including interest at 6 per cent. Including the passage and other public lights, one 16-candle power equivalent was required for every 34 square feet of rentable floor-space in the building. It is exceptional to find the cost of lighting worked out in this way.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Higginshaw Gas-Works, Oldham.

The members of the Association visited last Saturday the Oldham Corporation Gas-Works at Higginshaw. The party numbered upwards of thirty; and a very interesting afternoon was spent in an inspection of the modern equipments that have recently been installed. Mr. Tim Duxbury, the Engineer, and Mr. Arthur Andrews, the General Manager, received the members at the works, and conducted them through the various sections, the special features of which were fully explained.

The gas-works of the Corporation consist of four separate stations—the Oldham, or central, with a productive capacity of 1 million cubic feet per 24 hours, all the retorts being direct-fired with hand stoking, and a storage capacity, in three holders, of 825,000 cubic feet; the Royton, with a productive capacity of 250,000 cubic feet per 24 hours, also having direct-fired retorts and hand stoking, with storage for 180,000 cubic feet; the Hollinwood, with a daily productive capacity of 3 million cubic feet of coal gas and 1 million cubic feet of carburetted water gas, all the retorts being direct-fired with hand stoking, with a storage capacity, in four holders, of rather more than 2 million cubic feet; and the Higginshaw station, which is the most modern, with a productive capacity of $4\frac{3}{4}$ million cubic feet per day and a storage capacity, in five holders, of about $3\frac{1}{4}$ millions. The Higginshaw works were opened in 1871, and prior to recent extensions, the retorts throughout were direct-fired with hand stoking; but they are now equipped with modern coal-handling and carbonizing plant. For the convenience of the visitors, Mr. Duxbury had prepared a special description of the works, dealing particularly with all the improvements introduced up to the present date; and from this we take the following notes.

After mentioning that a private siding connects the station with the main line of the Lancashire and Yorkshire Railway, Mr. Duxbury states that the first set of machinery for unloading and storing coal was installed in 1890. One end of the coal-waggon is lifted by a powerful overhead hoisting crab, supported by strong cast-iron columns and steel girders. Either end of the waggon may be lifted, its contents falling into a large hopper, passing through a coal-breaker, where it is reduced to a suitable size for power stoking machinery. The coal is elevated by the usual type of bucket elevator, and is conveyed the whole length of the coal-stores by means of a canvas band or belt, and deposited at any point in the stores. For stacking coal there are three stores, each with a capacity for 4000 tons.

There are three retort-houses, the first and second containing 20 through beds of sixes, or 240 mouthpieces each; and the third 19 through beds of eights, or 304 mouthpieces. In the first and second houses, the retorts are 20 in. by 22 in. through, built with fire-bricks and tiles, and are direct-fired with hand stoking. Each stoker carbonizes 63 cwt. of coal per eight-hour shift, with four-hour charges of $1\frac{3}{4}$ cwt. Furnacemen and coal and coke wheelers are provided in addition. Each of these houses will carbonize 126 tons of coal per day. No. 3 retort-house was the one to which most attention was paid by the visitors, as it was here that the most modern plant has been installed. This house, which has been recently erected, is supplied with retorts on the regenerative principle. Each is 22 in. by 16 in. by 20 ft. through, and capable of carbonizing 30 cwt. of coal per day, with six-hour charges. The whole house carbonizes about 228 tons of coal per day, or nearly as much as the two other houses together, the total daily capacity of the three houses being 480 tons, or (say) 4,800,000 cubic feet. The total make of gas at these works for the year ended March, 1903, was 528 million cubic feet. This house is also fitted with West's compressed-air drawing and charging machines, and hot-coke conveyors. On the coal-store side of the retort-house there are two bucket coal elevators and conveyors, driven by steam-engines, which lift the coal from the store into overhead receptacles for feeding the hoppers of the charging-machines. The coke on being drawn from the retorts falls into the conveyor trough below the stage floor, where it is quenched and carried outside the retort-house to overhead coke-hoppers and iron skips. These conveyors are worked by a 12-horse power steam-engine. The skips are carried by a travelling crane to four revolving screens driven by a Crossley 6-horse power gas-engine, where the coke and breeze fall into separate hoppers for loading into carts or railway waggons. The type of compressor is that known as the "double line," in which there are two steam cylinders in tandem with the air cylinders; and it also supplies air for capstans in various parts of the works. There are six lengths of hydraulic mains on either side of the retort-bench—three beds to one length of main; the gas, tar, and liquor being taken off through a regulating seal-valve connected to the foul main, which runs along and through the old retort-houses. These pipes act as condensers, no other condensing plant being provided. In order to ensure a water-seal in the hydraulic mains, a separate tar main and flushing-out arrangement is being fixed. The whole of this work (except the retort-house building) was carried out by West's Gas Improvement Company, Limited.

There are four vertical exhausters of the Anderson type, the capacity of each being 60,000 cubic feet per hour. The two hot

scrubbers on the inlet of the exhausters are filled with coke. The eight larger scrubbers on the outlet are worked in pairs, and filled alternately with coke and wood grids. Their height is 30 feet, and their diameter 8 feet. Special attention was directed to a new Holmes washer-scrubber which has just been added, capable of dealing with 3 million cubic feet of gas per day, and fitted with preparations for abstracting the cyanides from the gas. There are eight ordinary water-lute purifiers, arranged in two sets, with 20-inch dry centre-valves. The boxes are 20 feet square and 4 feet deep, and are worked three on and one off. The bottom layer is oxide and the top one lime.

On the gasholder inlet is fixed a Maxim-Clark benzol carburettor, capable of enriching 200,000 cubic feet of gas per hour; the gas being enriched throughout the whole of the 24 hours. Of the five gasholders, four have each a capacity of 400,000 cubic feet, while the fifth will hold 1,600,000 feet; the total capacity being 3,200,000 cubic feet. The governors are Newton's make, of the ordinary type. There are two station meters—one by Newton, with a capacity of 60,000 cubic feet per hour, and the other by Braddock, capable of passing 100,000 cubic feet per hour.

The total productive capacity of all the gas-works of the Corporation is 10 million cubic feet per day; the maximum delivery being 8,060,000 cubic feet. For public lighting, which is under the control of the Gas Committee, all the main thoroughfares in the borough are provided with incandescent lamps. Keith's high-pressure system has been installed in front of the Town Hall, and self-intensifying lamps are fixed in other parts of the town. The total amount of profits utilized for assisting the rates (which in 1866 was limited to 6 per cent. on the amount of borrowed capital, out of which sum the interest and redemption fund charges have to be paid), has amounted to £349,320 since the Corporation acquired the undertaking in 1853.

After completing the tour of the works, the members of the Association were invited to tea, in one of the large rooms of the offices.

The PRESIDENT (Mr. W. Hill) having briefly given expression to the pleasure the members had experienced in their visit to the works,

Mr. GARLICK (Salford) moved a vote of thanks to Mr. Duxbury, the members of the Gas Committee, and the officials, for the hospitable and cordial manner in which the Association had been received. They were greatly indebted to Mr. Duxbury for the full and complete opportunity afforded for a thorough inspection of the works; and they had had a most enjoyable afternoon.

Mr. STODDARD (Halifax) seconded the motion; and the vote was most heartily accorded.

Mr. DUXBURY, in reply, said the opportunity of meeting the members had given him great pleasure. He had taken an interest in the Association since the commencement; and he felt sure they were going on the right lines. Twenty years ago there was no such society in existence; and the great value of the Association had been more than fully demonstrated. They had now many facilities for visiting various works; and he urged the members to take advantage of all these opportunities. It was essential that they should see all they could of what other people were doing, if they were to keep abreast of the times. At the works which they had just gone through, they had some up-to-date plant; and great credit was due to Mr. Chadwick, the former Manager, for setting the ball rolling. They were contemplating putting more new plant in the retort-house; but it was not yet decided what form it would take. At one time he was all for inclined retorts; but now he was more in favour of machines. Under the new conditions which had arisen, he thought inclined retorts were better fitted for small works. After giving some comparisons with reference to various plants, and speaking of the efficiency of conveying machinery, Mr. Duxbury expressed, on behalf of himself, with his Committee, their hearty acknowledgment of the vote of thanks, and, in conclusion, wished the Association success.

GAS POWER FOR ELECTRIC CENTRAL STATIONS.

At a recent Meeting of the American Institute of Electrical Engineers, a paper on the subject of employing gas power for operating central stations for generating electricity in connection with gas-works was presented by Mr. J. R. BIBBINS. The text of the paper has been published in "Progressive Age;" and we make therefrom the following extracts.

At the present time, two competitors of the reciprocating steam-engine—the steam-turbine and the gas-engine—seem to be attracting attention. Heretofore the interest taken in gas-engine plants seems to have been confined chiefly to those operating in foreign countries; but as there are a number of successful installations of this kind in the United States, it might be worth while to present a few facts about their operation.

It is intended to offer testimony upon four contentions: (1) That present gas-power machinery is suitable for central station service. (2) That a well-equipped gas-power electric plant can operate with far better economy than a steam plant under similar conditions. (3) That its operation is much simpler, and requires less running expense for the same results. (4) That gas-works labouring under low load or output factor can profitably install a gas-power electric generating station, and be their own largest customer, selling gas and electricity at competitive rates.

The basis of this paper consists of data collected from various electric light and power plants in the United States using gas-engines as their principal motive power. A number of these plants being operated in connection with works supplying illuminating gas, it has been possible to observe the somewhat unique position of the gas-engine station as a direct, though affiliated, competitor of gas-works.

The following table presents the most important data upon the general equipment and service rendered by the first twelve plants considered. They are located in centres ranging from 2000 to 20,000 inhabitants, and, in most cases, where the cost of fuel is high. The equipments average about 315 brake horse power capacity, and operate every standard form of generator for arc and incandescent lighting and for railway or general power service. All the generators are belted, the majority directly, but a few through the medium of a jack-shaft; the latter arrangement being employed in order to obtain the desired flexibility of service without installing a number of engines of small size.

Plant No.	Engines.				Generators.
	Rated Capacity, Full Load. B.H.P.	No.	B.H.P.	Efficiency.	Total Generating capacity. Kilowatts.
1	685	3	125-280	82·5	370
2	170	2	85	80·0	112
3	110	2	55	75·0	75
4	90	2	35	80·0	40
5	320	4	55-125	75·0	232
6	340	4	55-125	75·0	215
7	305	3	55-125	82·5	260
8	280	1	280	80·0	152
9	..	2	55-85	..	..
10	85	1	85	80·0	60
11	803	6	125-210	82·5	476
12	255	3	85	80·0	116
	Aver. 314				
13	375	3	125	85·0	75
14	491	4	125	85·0	75
15	840	3	280	85·0	150
	Aver. 568				

Plants 13 to 15 are somewhat larger than the others, and generate polyphase power for industrial works. These three plants average approximately 570 brake horse power, and the units are all direct-connected and run in parallel. Operative results have been obtained from plants 1 to 11 inclusive—the first and last furnishing excellent data upon the comparative economy of the present gas-engines and the steam-engines which were replaced. In general, the character of electrical equipment is not all that could be desired for furnishing results of great accuracy; but, owing to the more or less uncertain calorific value of the fuel gas used, slight percentage errors in particular cases will not have much effect on the general result. In any event, the average cost of power charged against the station is the desired figure.

In considering the subject in hand from an unbiassed standpoint, it is important to enumerate the qualifications imposed upon the gas-engine, in order to determine its actual merits. These are: (1) Continuity of service at any cost. (2) Simplicity of operation, conducing to the foregoing, and securing low cost of attendance. (3) Reasonable cost of equipment. (4) Economy of fuel and supplies.

A 65-horse two-cylinder vertical engine of the type employed in the plants here considered has made the following record:—

Load	Fan blower.	
Total elapsed time	8472 hours.	
Length of run	8230 ,,	or 97 per cent.
Number of hours plant was shut down—		
Changing igniters	38 hours.	
Taking up bearings	13 ,,	
Painting	179 ,,	
Repairing blower	5 ,,	
Changing gas supply	7 ,,	
Total	242 hours,	or 3 per cent.

During this period, the engine ran, without stopping, for 1157 hours, and was then shut down to repair a broken belt.

In a pumping-station located on the Allegheny, a short distance from Pittsburgh, five 85-horse power engines of the same type operate regularly at full load through the week without stopping, except on Sunday, when the units are shut down in rotation for inspection and repair. Each engine operates from 96 to 98 per cent. of the elapsed time. It is needless to state that such service would not be required in central stations, as reserve capacity should be available for use during peak loads. In the present exhibit, the majority of the plants operate from 18 to 22 hours per day, giving ample time for inspection and repair, even if no reserve capacity were provided.

The skill required for operating a gas plant is apparently no greater than for a steam plant. In several instances where the

latter has been replaced, the old employees have been retained. In newly-established plants, steam engineers have invariably taken charge after short preliminary instruction from the builders' erecting engineer. In cost, the gas-engine equipment is quite comparable with that of a steam plant; but with natural or illuminating gas supply available, the cost would fall considerably below that of a steam equipment of boilers, engines, condensers, heaters, pumps, &c. In the case of a producer-gas plant installed to supply the engines, the cost of the respective equipments, each of 1000-horse power, is about equal, though depending somewhat upon the gas storage capacity provided. This, however, amounts to much less than the storage of electricity.

In economy of fuel, the gas-engine admittedly has no rival. The present limit of steam-engine practice is 10 lbs. of water per indicated horse power, or 11 lbs. per brake horse power. With an evaporation of 10 lbs. of water per pound of good coal (14,000 B.T.U. per pound), a performance of 1·1 lbs. of coal, or 15,400 B.T.U., per brake horse power, is realized. The gas-engine at present delivers at full load a brake horse power upon 10·5 to 11 cubic feet of gas (of 900 to 1000 B.T.U. per cubic foot), which is equivalent to 10,000 to 11,000 B.T.U. per brake horse power.

The advantages of the gas-engine for central stations may be summarized thus: (1) Minimum fuel and heat consumption. (2) Light load efficiency higher than steam-engine of corresponding size. (3) Low cost of operation and maintenance. (4) Simplification of equipment. (5) Small number of auxiliaries required. (6) Absence of stand-by losses. (7) Quick starting. (8) Waste heat in jacket water suitable for building heating. (9) Ease of extending equipment. (10) Absence of high pressure except in engine cylinder. (No danger from explosion outside, as a mixture of proper proportions is required.) (11) Power can be stored during light loads at small cost in the form of gas in a holder. (12) Sub-division of units more easily accomplished, yielding higher all-day economy.

An important source of economy in gas plants is the fact that as soon as an engine is shut down all heat losses cease. Also, during operation, no heat is lost by the gas in transit from the producer; and the plant is not hampered by inefficient auxiliaries such as steam-pumps, condensers, return-traps, &c., all of which largely increase the general complexity of the system. Steam-pipe and cylinder condensation losses, radiation, leakage, and fuel loss in banking fires, have no parallel in the gas plant. The only auxiliaries required are the igniter generators and air compressors. The former are negligible as affecting the economy of the station; and the latter operate at full capacity at regular intervals. In cases where artesian wells supply jacket water, a pump is, of course, required, preferably operated by a motor or small gas-engine, to which the air-compressor may be belted.

In quick starting, the gas-engine fulfils every requirement. The 280-horse power pumping units of the Philadelphia high-pressure fire system have been repeatedly started cold, brought up to speed, and the pumps loaded to the required pressure (300 lbs. per square inch) within a period of 40 seconds from the starting signal. In plant No. 11, the units are regularly started in two minutes; and this may be reduced to one minute in case of necessity.

A number of plants make use of the hot jacket water for heating the building and office; ordinary cast-iron or coil-pipe radiators being used for this purpose. Part of the return water is sent again through the jackets; the temperature being lowered to the proper degree by adding fresh water from the station supply main. Station No. 14 returns the hot jacket water to a cistern, where it partially cools and is again pumped through the jackets, emerging at a temperature of 200° Fahr. before being discharged into the sewer. As return water from a heating system is also discharged into this well, a small amount of cold water from an artesian well or the city water system is added from time to time, to reduce the general temperature of the circulating system. In another plant, the jacket water is utilized in winter for warming the water in the gasholders to prevent freezing. This was formerly done by utilizing live steam from a boiler used in making water gas. It is estimated by the manager that a saving of $250 per annum is effected. In locations where water is costly, a small cooling tower may be profitably installed to cool the jacket water, which may then be saved.

Several distinct fuel gases suitable for gas-engine use are available. When reduced to calorific values per cubic foot of explosive mixture of proper constituency, it will be seen by the following table that the ratings are nearly equal:—

	Approximate B.T.U. per Cubic Foot.	
	Gas.	Mixture.
Natural gas	1000	91·0
Coal gas	650	91·7
Water gas	300	88 0
Carburetted water gas	600	92·0
Producer gas	120 to 145	60 to 68
Coke-oven gas	600	90·0
Blast-furnace gas	90	53·0

The power to be developed by an engine of given proportions does not, therefore, vary within appreciable limits, except on producer gas and blast-furnace gas, when larger engines are required, or large cylinders on the same engine-frames. The rate of combustion is, however, less rapid with these than with other gases, due to the large amount of inert gases, such as nitrogen and carbon dioxide, present in the mixture. The compression may also be carried much higher without risk of pre-ignition or firing-back; thus increasing the efficiency of the cycle. With water gas, the high percentage of hydrogen occasions quicker combustion and higher flame temperatures, with so considerable a tendency to pre-ignition and firing-back that this gas is not well adapted to engine work.

In water-gas plants, a great saving may be effected, and the gas rendered much more suitable for the operation of engines, by providing additional holders for the air or blast gas made during the period when the producers are under blast. This gas is equivalent in calorific value to blast-furnace gas (90 B.T.U.), and is generally allowed to go to waste. It may, however, be used to great advantage for power purposes, either alone or mixed with a proportion of water gas, which it renders less snappy, and thereby better suited for use in gas-engines. In fact, by this means a gas is obtained similar in many respects to the producer gases made by operating a producer continuously with combined steam and air blasts.

Leaving out of consideration the bye-product or waste coke-oven and blast-furnace gases, as occupying a field of power development somewhat foreign to the subject in hand, producer gas offers at present the greatest possibilities in the field of power for use in manufacturing centres. This is due to its comparative cheapness, simplicity of installation, and general efficiency when gas for power purposes is alone considered.

A comparison of the approximate thermal efficiencies of the various processes gives the following results:—

	Per Cent.
Coal gas, without coke	24
,, ,, with coke	60
Water gas	60
,, ,, special quick blast	75 to 80
Producer gas	80 to 85

Assuming the calorific value of coal as 14,000 B.T.U. per pound, and the efficiency of the gas-making process 80 per cent., the heat available at the engine is 11,250 B.T.U., which is equivalent to about one brake horse power. This duty should therefore be expected from a well-equipped gas-power plant.

(*To be continued.*)

THE ECONOMIC VALUE OF GAS COALS.

A paper on the above subject was read before the Meeting of the German Society of Gas and Water Engineers, held at Zürich last summer—the first part by Herr Wunder, of Leipzig, and the second part by Dr. Bunte.

After pointing out that the actual value of any description of coal from the gas maker's standpoint depends on the quantity and quality of the coke, of the tar, and of the ammoniacal liquor it yields, as well as on the calorific value and illuminating power of the gas, Herr Wunder proceeded to review briefly the work that has already been done in the direction of appraising the relative merits of coals by past investigators, such as Schiele, Schilling, and Bunte. Much of this work is still of interest; but its importance is diminished by the comparatively few samples that were examined, by the lack of instruments to accurately gauge the temperature in the retorts, and, more particularly during the past decade, by the advent of the incandescent mantle, which has rendered illuminating power in the gas of less consequence than formerly.

At the last meeting of the Society of Saxon and Thuringian Gas Engineers, which was held in Leipzig during February, 1903, therefore, Herr Wunder drew attention to the lack of precise and systematic knowledge upon this subject, suggesting that fresh researches should be instituted in the smaller gas-works of Germany, where the conditions of carbonization permit experiments to be carried out. Dr. Bunte then offered to make the necessary chemical examination of any authenticated coal samples that might be sent him, and completed his analyses in time to describe their results before the Zürich Conference. Herr Wunder concluded his address by moving a resolution that the German Society should undertake an extended investigation into the practical or economic value of different varieties of gas coals.

Dr. Bunte began his remarks by observing that the phenomena of coal combustion are much simpler than those of coal carbonization; and yet it is still a very uncommon thing for a coal which is to be used to generate heat to be bought or sold according to its calorific value. It might well seem that an ultimate analysis of such a material as coal, of whose proximate constitution scarcely anything is known, should not afford any means for judging of its practical value, because there exist innumerable substances containing the same proportions of carbon, hydrogen, oxygen, &c., which exhibit very different properties. This objection was urged twenty-five years ago, and met with acceptance. Nevertheless, experience has demonstrated that there is an intimate connection between chemical composition and heat of combustion or calorific value; and latterly calorimetric methods have been so much improved that calculation of calorific power from ultimate composition is no longer necessary. To the gas maker, however, the

actual value of a coal depends upon factors other than calorific power; and there can be no doubt that an elementary analysis of a sample yields some of the most important criteria whereby its utility in the factory can be estimated.

Dr. Bunte next proceeded to give the meeting an account of the chemical examination he had just finished into eight different specimens of coal—one coming from Normanton, in England, three from Upper Silesia, two from Saxony, and one each from the Ruhr and from Waldenburg. The figures relating to four of these—the two Saxon samples, one Silesian, and the one from the Ruhr—were specially interesting, because the same coals were tested fifteen years ago. Expressed diagrammatically, the investigation showed that each coal remained practically constant in composition during that period of time (there being a slight diminution in the percentage of moisture); and this bears out what Dr. Bunte had already found to be the case with the gas coals from the Saar district, and some others, when examined between 1878 and 1885. Manifestly, uniformity in the composition of a coal is of great importance to the gas engineer; for, when he can place dependence upon the homogeneity from time to time of his raw material, he knows better where to seek the cause of any alteration, defect, or improvement in the results he obtains in the factory. Such regularity in the composition of a coal procured from the same source is not always to be reckoned on; but where it is, the coal may well be worth a higher price. As is known, the greatest variation in the composition of any coal of nominal identity, lies in its proportion of ash; and although a coal with 5 per cent. more ash must yield 5 per cent. less gas, the extra inorganic matter also increases the cost of material and labour required to feed the furnaces, &c.

With the object of seeing how far the gas-making value of a coal may be estimated from its laboratory examination, the characteristics of two different specimens may be considered. The first of these is a coal from the Königin Louise Mine in Upper Silesia—an old coal containing about 2 per cent. of moisture, and, roughly, 4 per cent. of ash in its air-dried condition; the second being a more modern coal from a mine at Zwickau, in Saxony, with 6·5 per cent. of moisture and about 8·5 per cent. of ash. These may be compared in tabular form thus:—

	Silesian.		Saxon.
Percentage of true coal	94·00	..	85·00
Ratio	100·00	..	90·40
,, of ash	3·45	..	8·18
,, of coke	69·03	..	58·38
,, of ash in dry coke	5·00	..	14·00
,, of combustible matter	95·00	..	86·00
Calorific value of 1 lb. of coke (large cals.)	3,500·00	..	3,170·00
Ratio	100·00	..	90·50
Percentage (on coal) of coke consumed under retorts, &c.	15·00	..	16·60
,, of residual coke	54·00	..	41·80
Ratio	100·00	..	77·00
Calorific value of residual coke	18,888·00	..	13,236·00
Ratio	100·00	..	70 00

From this, it appears that, without taking account of the conditions which occur on the large scale, if the two coals are carbonized similarly, the ratio between the amounts of coke left as bye-products is 100 : 77; while the ratio between the heating powers of the cokes is 100 : 70. In other words, the calorific value of the available Saxon coke is 30 per cent. less than that of the Silesian sample. The mechanical strength of the coke can naturally not be measured in a laboratory experiment, nor can the volume or quality of the gas made be ascertained; for if results are to be obtained comparable with those of the factory, the conditions during the test must resemble those occurring in the retorts. Still, as M. St. Claire-Deville and Herr Drehschmidt have shown, if the ultimate composition of the coal is taken into consideration, conclusions of practical value can be drawn from small experiments.

Dr. Bunte has also investigated this point—carbonizing on a large scale five different coals, the chemical composition of which was known; and, if it be allowable to generalize from so small a number, it may be said that, when coals are carbonized under similar conditions, the results will depend on the ultimate composition of the materials. Thus it may be assumed that the Silesian coal described above should yield essentially the same quantity of gas as the coals from the Saar district, whose composition is similar—viz., 11,850 cubic feet per ton of true coal substance. Allowing for the 6 per cent. of non-coal present, this becomes 11,130 cubic feet. The true coal in the Saxon sample should, by analogy, give 10,750 cubic feet per ton of pure coal—a figure which becomes 9150 cubic feet when the make corresponding with the 15 per cent. of moisture and ash is deducted. These yields of 11,130 and of 9150 cubic feet stand in the ratio of 100:82—*i.e.*, the Saxon coal should give 18 per cent. less gas per unit weight carbonized.

When attempting to estimate roughly the practical value of a gas coal from such data as these, it is necessary to bear in mind the relative local value of the gas and of the coke. Where gas is dear and coke is cheap, conditions are different from a place where coke fetches a high price and gas a low one. Moreover, it is needful to remember that when, as in the samples discussed already, 17 per cent. more of one coal than of another has to be carbonized to give a certain volume of gas, seven retorts must be fired instead of six; and the various expenses of the works increase in a similar fashion.

Although it is known that an increase in the temperature of carbonization increases the make of gas, decreases its latent illuminating power, and alters its calorific value, sufficient data are not yet available to judge how far it is economically advantageous to urge the retort temperature in order to obtain the best quantity and quality of gas. Many of the gases and vapours evolved at a low temperature lose hydrogen when more strongly heated, and increase in volume; one volume of ethylene or methane yielding 2 volumes of hydrogen, 1 volume of benzene becoming 3 volumes. But such increment may be at the expense of the heating power of the gas, as well as to the disadvantage of its natural illuminating power; for, to give only one example, 1 volume of methane, with a calorific value of some 8500 units, becomes 2 volumes of hydrogen possessing but 5200 units.

It is clear that the problems now before the gas engineer are different from those of ten years ago. The questions at the present time are rather, What kind of coal can be best used for the manufacture of a good heating gas, and in what circumstances will the largest make of heating gas be obtained? Researches to elucidate these problems have not yet been instituted; and they are sorely wanted. They cannot, however, be carried out on large gas-works or on small; a properly equipped experimental station is required, where not only the properties of the raw materials can be examined, but also the conditions of satisfactory gas production be ascertained, and where the conditions can be altered at pleasure.

A Large Spanish Water Scheme.—The "Gaceta de Madrid" contains a notice of a concession for carrying out the reform and improvement of the water supply of the city of Valencia presented by the Sociedad de Aguas Potables y Mejoras de Valencia, and administering the supply for 95 years on terms which are named. The total cost of the work is estimated at 4,165,000 pesetas (about £121,075), which includes 500,000 pesetas already laid out.

Wellington Gas Bill.—The Wellington (Somerset) Urban District Council were recently discussing the question of opposing or otherwise the Bill which is being promoted by the Wellington Gas Company. Mr. Sparkes expressed the opinion that the Directors would not do anything that would be detrimental to the interests of the town. The Council should, however, see to it that nothing in the Bill made it more difficult for the ratepayers to acquire the gas-works, if they should wish to do so. He thought the expense of opposing the Bill might be saved if a deputation from the Council met the Directors. Mr. Pope said certain of the townspeople were in favour of the purchase of the works; and it might be well to call a meeting to ascertain public feeling on the question. He agreed, however, with Mr. Sparkes as to the desirability of a meeting with the Board; and it was decided to invite the Directors to meet a Committee of the Council.

Boston (Mass.) Water Supply.—The Weston aqueduct of the Metropolitan Water-Works of Boston was formally brought into use on the 29th ult. The aqueduct has a nominal capacity of 300 million gallons per day, and is designed to deliver from the impounding reservoir a large additional supply, supplementing the now outgrown Sudbury and Cochituate aqueducts. Furthermore, this additional quantity will be delivered at a sufficient elevation to dispense with a part, and perhaps ultimately all, of the low-service pumping now done at one of the Chestnut Hill pumping-stations. For the present, about 35 million gallons will be sent through the Weston aqueduct and delivered into the distribution system through 60 and 48 inch pipelines. Construction work was begun in the spring of 1901, and the aqueduct is now substantially completed; having been built in all details practically in exact accordance with the designs of Mr. F. P. Stearns, the Chief Engineer of the Board.

Proposed Government Control of Water Supplies.—At the monthly meeting of the Manchester Geological and Mining Society held last Tuesday, Mr. W. Pickstone, referring to the question of the country's water supply, which formed the subject of a paper given by him to the Society some months ago, said his feeling increased that the Government ought to take charge of our general water supply, by the creation of a special department for the purpose. It was necessary to utilize the water that came down from the clouds; and in order to do this, larger reservoirs were required. When a local authority obtained their water supply from a long distance, great expense was involved by the need of wayleaves. By putting the matter in the hands of the Government, this would be avoided, as a special department could adjudicate and decide what was really a fair claim in such a case. Mr. J. Dickinson said he thought the Legislature would pause for a long time before interfering with the delicate question of water rights or altering the existing law in regard thereto.

District Councils and Water-Rents.—We learn from the "Local Government Journal" that Mr. Hibbert, the District Auditor, has called the attention of the Wigton Urban District Council to the arrears of water-rents, and has made some important statements regarding the method of collection. He said the water-rents should be made for the quarters ending June, September, December, and March, and were payable in advance under the Water-Works Clauses Act, 1847; and he wished to know what measures the Council meant to take to set the matter right, as well as to recover the large amount of arrears. No doubt the owners ought to be assessed, under the Act named, for houses of less than £10 rateable value, more particularly seeing that the Council were obtaining water from a new source, by virtue of powers possessed under the Public Health Act. It seemed quite clear that the powers (if any) of the Council under their private Act did not extend to a water supply obtained from a source other than that provided by the Act, and that the Council were working almost entirely under the Public Health and Water-Works Clauses Acts. Of course, notice of the change should be given some time beforehand, so that owners of properties under £10 in value might arrange for the change.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Use of Flueless Gas-Stoves.

SIR,—I have read the very interesting communication from Mr. Leicester Greville which appeared in the "JOURNAL" for the 12th inst., in which he gives the results of some tests made by him with condensing gas-stoves, about twenty years back. From his description, these were stoves evidently made according to a mathematical system worked out by me for the purpose, and by which the hot products of combustion were cooled by being caused to pass over a known expanse of metal surface. This gave satisfactory results when the exact quantity of gas was consumed for which the apparatus was constructed; but when it was exceeded, the products of combustion passed out to a considerable extent through the side columns in the form of vapour.

In the first table, 6 cubic feet of gas would be the right amount to consume in the stove. On exceeding this quantity, vapour would be formed in the side columns, and the efficiency of the stove would be considerably decreased as regards condensation; and on increasing the quantity of the gas consumed, the vapour would be increased in like manner. Again, as the temperature of the side columns increased, the vapour would increase, and the quantity of liquid produced in proportion to the gas consumed would decrease. In the second stove mentioned, with regard to the third and fourth tables, evidently 6 cubic feet per hour was the correct quantity to consume to produce the proper result. This rule was perfectly correct so long as it was adhered to; but it necessitated the stoves being of large proportions, and costly in the same degree So various makers have since flooded the market with sundry imitations, all more or less unsatisfactory in their construction and working. Having the knowledge that a thoroughly satisfactory condensing gas-stove could not be constructed unless the vapour was dealt with so that it did not escape from the stove, but was made to give up all the latent heat produced from the gas, by being again heated and thoroughly expanded, in such a manner that it should be caused to increase the expansion already taking place in the hot gases, I commenced to conduct experiments which extended over a long period. These finally resulted in my invention of the condensation of the products of combustion, by induction, as carried out in the Carron condensing stove, by which the vapour is successfully dealt with, and the heat is all given off by radiation.

The foregoing will, I think, explain the causes of the varying efficiency in the stoves tested by Mr. Leicester Greville. As regards acetylene, I have never heard of this being found in any tests of condensing gas-stoves, and do not think it could be so discovered, unless the burners through which the gas passed happened to have some exceedingly bad fault in their construction.

F. R. E. BRANSTON.

Jan. 15, 1904.

APPLICATIONS FOR LETTERS PATENT.

15.—DARWIN, H., "Incandescent gas lighting." Jan. 1.
54.—DENNY, T. J., "Gas-producers." Jan. 1.
67.—FISCHER, H. T. W., "Lighting of bakers' ovens." A communication from G. Lubcke. Jan. 1.
69.—EDWARDS, E., "Gas-engines." Jan. 1.
105.—REDMAN, T., "Purifying Gas." Jan. 2.
123.—BLERIOT, L., "Acetylene generators." Jan. 2.
138.—HUDSON, O. M., "Incandescent Burners." Jan. 2.
227.—HEMINGWAY, H. W., "Desulphurization of sulphuretted hydrogen." Jan. 4.
323.—TULLY, S. J. B., "Production of water gas, producer gas, or steam." Jan. 6.
357.—ZECHNALL, L., "Imitation candle for incandescent gas-light." Jan. 6.
403.—GRIEVE, G. K., and PEEBLES, W. C., "Gas-governors." Jan. 7.
413.—WHITE, T., "Transporting coal." Jan. 7.
427.—HUTCHINSON, R R., "Internal combustion engines." Jan. 7.
462.—WORMSER, L., "India-rubber gas-pipe couplings." A communication from E. Gerard. Jan. 7.
467.—TALBOT, F. W., "Connecting branch-pipes to mains." Jan. 7.
473.—NAUMANN, E., "Producing nitrate of ammonia from sulphate of ammonia." Jan. 7.
481.—ATKINSON, T., and BOND, T., "Anti-back lighter or firer applicable to incandescent burners." Jan. 8.
495.—MITCHESON, H., and FREEMAN, W. W., "Draining coke." Jan. 8.
509.—WEBB, R. H. S., "Acetylene generators." Jan. 8.
510.—MELHUISH, A. G., "Internal combustion engines." Jan. 8.
532.—HOWORTH, F. W., "Discharging retorts." A communication from the Compagnie Parisienne d'Eclairage et de Chauffage par le Gaz. Jan. 8.
544.—ARMSTRONG, J., "Producer gas." Jan. 8.
551.—MELHUISH, A. G., "Internal combustion engines." Jan. 8.
568.—ADAMS, M. J., "Incandescent mantles." Jan. 9.
576.—KEY, J. T., "Bye-product coke-ovens." Jan. 9.
588.—HUGHES, J. R., "Inverted burner bracket." Jan. 9.
589.—WILSON, H., and WILSONS and MATHIESONS, LTD., "Rapidly heating water." Jan 9.
597.—DOCHERTY, H. F., and CRAIG, A. M., "Gas boiling-rings." Jan. 9.
599.—M'KNIGHT, J. W., "Regenerating gas-burners." Jan. 9.
610.—SCOTT-SNELL, C., "Supply of gas for combustion." Jan. 9.
622.—THE GAS ECONOMIZING AND IMPROVED LIGHT SYNDICATE, LTD., and M'COLL, J., "Enriching coal gas." Jan. 9.

LEGAL INTELLIGENCE.

A SEQUEL TO THE ARSENIC IN BEER SCARE.

Mr. Justice Bruce was engaged, in the King's Bench Division of the High Court of Justice, nearly the whole of last week in hearing an action brought by Messrs. Bostock and Co., Limited, of Liverpool, against Messrs. John Nicholson and Sons, Limited, of the Hunslet Chemical Works, Leeds, to recover damages for supplying to them sulphuric acid not made from brimstone, and not a pure commercial acid, and containing arsenic, under, and in breach of, a contract to supply pure commercial sulphuric acid made from brimstone.

It seems, from the opening statement by Mr. C. A. Russell, K.C., for the plaintiffs (now in liquidation), that they were manufacturers of brewing sugars, and for this purpose sulphuric acid was used. From March to November, 1900, the defendants delivered sulphuric acid to the plaintiffs containing considerable quantities of arsenic. The sugar, and consequently the beer, was impregnated therewith; and several deaths occurred among consumers in consequence. The result to the plaintiffs was the ruin of their business; and the question in the action was whether, and to what extent, they were entitled to hold the defendants responsible. Business dealings between the parties began many years before the above-named date. Till March, 1900, the sulphuric acid supplied by the defendants was commercially free from arsenic. Sulphuric acid was at one time largely, and now also partly, manufactured from brimstone; and if prepared in this way, it was not liable to the impurity of arsenic. If manufactured from pyrites, however, it was liable. The acid originally supplied by the defendants to the plaintiffs was a brimstone acid. Sulphuric acid was manufactured pretty generally in two different strengths. Before March, 1900, the plaintiffs' Chemist from time to time tested the acid delivered by defendants, and never discovered any arsenic. He in consequence, after a time, desisted from further testing it, believing it was certain to be pure. In January, 1900, the defendants were behind in their deliveries; and the plaintiffs then placed an order with another manufacturer, and their Chemist did test the acid sent by him. There was therefore no negligence on his part. Investigation had shown that all the acid sent by the defendants from March 6, 1900, to Nov. 20, 1900, was mixed with arsenic. In the meantime, a large quantity of beer had been brewed, and was tainted therewith. Enormous claims were made against the plaintiffs, and an action brought against them by Messrs. Holden, a firm of brewers, terminated in a verdict for £1980; and it was upheld in the Court of Appeal. The quantity of sugar into which this arsenious acid entered was something more than 4000 tons. The plaintiffs were entitled to the value of the sugar rendered unfit by the contamination. Another important head of the plaintiffs' claim was that their business was ruined by this disaster. The goodwill was destroyed, and the land owned by the plaintiffs had been much depreciated in value.

At the close of Counsel's opening speech, witnesses were called in support of the plaintiffs' case. A large quantity of expert and scientific evidence was given in regard to the details of the manufacture of sulphuric acid and brewing sugars, from which it appeared that acid made from brimstone is practically free from arsenic, whereas if made from pyrites it is always liable to contain it in substantial quantities. One witness (Dr. Campbell Brown, the Public Analyst for Liverpool) stated that as much as 2·6 per cent. of arsenic was found in one sample of sulphuric acid sent to the plaintiffs by the defendants, and that the amount of arsenic in the sulphuric acid supplied would, he calculated, be enough to kill a million people every week. This evidence occupied the Court till Friday, when the plaintiffs' case closed.

Sir Edward Clarke, K.C., on behalf of the defendants, submitted that there was no case of fraud to be considered; the only questions were whether the defendants were liable for a breach of contract in not supplying what they had undertaken to supply, and whether they were liable for a breach of warranty in not delivering sulphuric acid of the specified quality. His Lordship inquired whether the plaintiffs relied upon fraud. Mr. Russell said they suggested that the fraud consisted in saying that they were going to supply acid made from brimstone, knowing that they intended to make it from other substances.

Mr. John Nicholson, a Director of defendant Company, was the first witness called for them. He said they had never known that Bostocks used sulphuric acid for making anything that was to be put into beer or into any article of human food. During the last thirty years, the use of brimstone in making sulphuric acid had been practically superseded by the use of pyrites. Brimstone acid meant in the trade acid free from arsenic—that is, purified acid; B.O.V. meant unpurified acid. He never had the slightest idea that Nicholsons were bound to supply purified acid to Bostocks; and in March, 1900, when they began sending in unpurified acid, he considered that they were entitled to do so.

The case was continued yesterday.

BANBRIDGE QUARTER SESSIONS.—Saturday, Jan. 9.

(*Before Judge* ORR)

Downey and Downey v. The Banbridge Gas Company—Damages for Gas Poisoning.

This was a case in which Arthur Downey, a tailor, sued the Banbridge Gas Company to recover £50 damages for discharging, and allowing to be discharged, noxious gases and vapours on his premises in Dromore Street, and for personal injuries sustained. Rose Downey, his wife, also sued the Company to recover £30 for like damages.

Mr. WILLIAMSON appeared for the plaintiffs, and Mr. HANNA for the defendants.

Mr *Downey*, in his evidence, explained the facts of the case. He said that he had resided in his present house for the past two years. He never used gas. On Sunday, the 18th of October last, he smelt

gas in his sitting-room, which was on the ground floor. There was a mark in a corner of the room, where there had been a meter. His wife called in the lamplighter about the matter, who said he would inform the Gas Manager (Mr. James Mearns). When Mr. Mearns arrived, he went into the room and examined the place where the meter formerly was. He refused to allow witness to bring him a light, and requested him to keep open the window, as there was an escape of gas, which he said he would attend to the next morning. When witness retired to rest that night, he closed the door of the parlour, and let the window of his bedroom down, and opened the door. He remembered nothing further until the following Tuesday, when he was taken to the infirmary, where he remained about fourteen days.

In cross-examination by Mr. HANNA, witness stated that he had never smelt gas in the house until the date named. When Mr. Mearns arrived, he said there was an escape of gas; but he did not say that it was coal gas. There was a distinct smell of gas in his bedroom when he went to bed. He put the window down about 18 inches; but notwithstanding this, he was almost suffocated.

Mrs. *Downey* corroborated her husband's evidence.

Rev. *C. Lupton*, who was the next witness, stated that on Monday, Oct. 19, he had occasion to call on Downey; but having knocked for some time, he failed to gain admission. He returned again in the evening, and succeeded in getting into the house. Mrs. Downey seemed to be in a stupid condition; and witness inquired for her husband. She then proceeded upstairs, where Mr. Downey was lying unconscious. As there was a strong smell of gas in the house, witness directed the persons who had assisted him in gaining admission not to strike a light, lest an explosion should take place.

Mr. *Joseph Woods*, Sanitary Sub-Officer, stated that he had the floor of the room opened. The soil underneath was quite dry; and there was a slight smell of gas arising from it. He did not see any drain.

Mr. *William W. Larmour*, Town Surveyor, deposed that he examined the place when the floor was opened. He saw the road outside opened early in December. There was a gas-pipe outside that had formerly been a service-pipe into the house. It was cut off about a foot from the outside wall of the house, and had white lead at the end of it.

William Close, plumber, deposed that, on opening the footpath outside the house, he found the gas-pipe that had been referred to by the previous witness. It reached up at that time to within 6 inches of the wall. There was white lead at the end of the pipe, but gas was even then escaping.

Dr. *William Smyth* said that, on entering the house, he noticed a strong smell of gas. He examined Downey, and found that his extremities were very cold. There was scarcely any heat in the body; and he could not have survived in that condition for more than an hour longer.

This concluded the case for the plaintiffs.

Mr. *James Mearns*, the Manager to the Gas Company, who was the first witness called for the defence, said that, after carefully examining the room, he could not find any trace of an escape of gas. He told Downey so, but advised him to leave the windows open, and also promised that he would have the gas-pipe cut off in the morning to satisfy them. He examined the place on the following Tuesday. The pressure was then on, but not so much as at night. The effect of an escape of gas on the soil in proximity to the place would be to blacken it. The soil was not blackened at this particular spot.

By Mr. WILLIAMSON: He had worked at gas all his life. He might have said that a gas manager often lost the sense of smell of gas.

To his HONOUR: He could not detect the smell of gas now as well as he could about forty years ago.

Hugh M'Keown deposed to having raised the parlour floor about a week after the occurrence. When engaged on this work, the men discovered an old drain under the house, leading across the street; and when the footpath was opened, he found that this drain was filled up just outside the house.

Mr. *James Whimster*, of Armagh, having also given evidence,

His HONOUR said the case was a fearful one; and if it had not been for the fact that Dr. Smyth was in time to attend to the sufferer, and that there was a well furnished hospital in the town, with a fully competent nursing staff, this unfortunate man would probably have lost his life. The plaintiff had evidently suffered severely; and accordingly he must give a decree for the highest amount he possibly could—namely, £50. He was perfectly sure that if the case had been tried in a Superior Court, before a Jury, the damages awarded would have been much larger. In the case of Mrs. Downey, he would give a decree for £15 damages. His Honour also allowed £3 10s. for expenses.

Claim for Damage to Slot Meter and Fittings by Fire.

On the 7th inst., before Judge Atkinson, at the Waltham Abbey County Court, the Enfield Gas Company sued one of their consumers named T. C. Davies, for the value of a slot meter and sundry fittings, including the usual pipes, pendants, &c, fixed with coin meters, which were destroyed by a fire at defendant's premises. The agreement signed by the defendant, which was put in, contained the following provision: "And I undertake that the above-named articles shall not be sold, removed, or damaged (fair wear and tear excepted) whilst hired by me." Under this, the plaintiffs claimed that any damage not being wear and tear, no matter how occurring, should be made good by the hirer. This contention was allowed by His Honour; and judgment was accordingly given in favour of the plaintiffs.

Prepayment Meter Theft at Aldershot.

A young labourer named Ticehurst was lately charged with stealing 10s. 3d. belonging to the Aldershot Gas and Water Company from a prepayment meter fixed in his father's house. On the collector visiting the premises, he found that the lock had been forced off the meter, and the contents of the box removed. It was stated that the prisoner, who pleaded guilty, was last April sentenced to fourteen days' hard labour for a similar offence. Mr. R. W. Edwards, the Secretary of the Company, said they had had considerable difficulty with their prepayment meters. The robbery with which prisoner was charged was one of two that had taken place in the previous week; and they had a number the perpetrators of which were never discovered. He asked the Magistrates to inflict a severe punishment, as such offences were extremely hard to bring home. Inconvenience was caused to the Company by them, and also to the consumers, who were liable to be charged with any damage to their meters. The Chairman said it was a very bad case. This was the second theft of the kind that the prisoner had been guilty of within twelve months; but the Bench did not wish to pass too severe a sentence. Prisoner would, however, have to undergo six weeks' hard labour.

Claim Against Mr. J. E. Addicks.

It is stated by the correspondent of the "Daily Telegraph" that last week the Receiver of the Bay State Gas Company began a suit in equity in the United States Circuit Court at Philadelphia against Mr. J. Edward Addicks, formerly President of the Company, asking that he shall be compelled to return to the Receiver all moneys expended by the Company since 1889, on the ground that such expenditures were illegally made at his dictation, and that a large part of them was appropriated to his own use. The amount involved covers about $4,000,000, and includes moneys spent for salaries, Directors' fees, office rents, telephone bills, and other items.

Responsibilities of Prepayment Meter Consumers.

At the Marylebone Police Court on Friday, Mr. Curtis Bennett had before him three summonses issued at the instance of the Gaslight and Coke Company, against working men living at Westbourne Park and Kilburn, for the recovery of the sums of 10s. 2d., 7s. 11d., and 4s. 8d. respectively, for gas supplied through prepayment meters. Mr. R. Humphreys, who prosecuted on behalf of the Company, said that in two of the cases it appeared that the money was taken from the meter by a sham collector, who represented himself as in the employ of the Company; but the defendants were nevertheless responsible for the money, according to the terms of the agreement. If they had only taken the trouble to ask the man for his receipt-book, they could have ascertained at once whether or not he was a proper collector. Mr. Curtis Bennett remarked that it was very hard upon them; but, under their agreement, they were clearly responsible for the money in the meter until the Company collected it. They must therefore be the losers. Mr. Humphreys said the defendants evidently relied on the man wearing a uniform. One of the defendants said he thought his responsibility ended when he put the money into the meter. Mr. Curtis Bennett replied that it ended only when the money had been collected by the authorized agent of the Company. He made orders for the payment of the amounts claimed, with 3s. costs. In the third case, the meter had been broken into and the contents stolen; but the Magistrate held the defendant liable, and made a similar order.

Gas and Electricity at Burton-on-Trent.—The Gas and Electricity Committee of the Burton-on-Trent Town Council are to enter into negotiations for a loan of £33,477, for new mains and services, additional lamps, &c. The consumption of both gas and electricity is increasing. The number of prepayment meters in use is 4150, as compared with 3750 in 1902; and the amount collected from them last year was £6985.

Electricity Not as Good as Gas.—Mr. Rich, a member of the Newport (I.W.) Town Council, says it is not only his opinion but that of many others, that since the introduction of electricity the lighting of the town has deteriorated to a great extent, and that the streets are not now so well lighted as they used to be by gas. The Council have therefore resolved to give attention to the matter, and to see that the Electric Company properly carry out their undertaking.

Power Users and the Price of Gas at Driffield.—The Driffield Urban District Council have lately been considering the question of discount to consumers of gas for power. The price for ordinary purposes is 3s. 4d. per 1000 cubic feet; and off this a discount of 20 per cent. is allowed to power users. Two large consumers, however, recently asked that this discount should be increased; and on the Council refusing, one of them ceased to take gas, and reverted to steam power. The other firm renewed their application; and at the last meeting of the Council, the Gas Committee recommended an increase of 5 per cent. in the discount allowed to them, making it 25 per cent. In moving the adoption of this recommendation, the Chairman said he regretted the Committee's decision was not arrived at sooner, as the Council had lost a good customer, and lost him hopelessly. The proposal was agreed to.

Bradford Gas Fund and the Cartwright Exhibition.—The minutes of the Finance and General Purposes Committee which were presented to last Tuesday's meeting of the Bradford City Council contained a proposal that, in order to enable the Cartwright Memorial Hall Exhibition Committee to continue their work pending the receipts of rents for space, admission money, &c., loans should be made from the unappropriated gas profits, such loans to be repaid to the gas fund, with interest at the rate of 3½ per cent., out of the assets and net revenue of the Exhibition Committee. Some discussion took place on this point; Mr. James Freeman objecting to the gas fund being touched for any object other than for the benefit of the gas-works or the consumers. He moved an amendment that the matter be referred back for further consideration; but on this being put to the vote, only the mover and seconder supported it. Alderman Goodwin, the Chairman of the Finance Committee, explained that the unappropriated gas profit was the only fund which the Council could legally use as capital for the exhibition.

MISCELLANEOUS NEWS.

A REMARKABLE GAS-FIRE IN PICCADILLY.

Fed by Three Gas-Mains—A Fascinating Spectacle.

Great sensation and inconvenience to pedestrian and vehicular traffic was occasioned last Wednesday in Piccadilly by a singular accident, which caused considerable alarm for the safety of the surrounding valuable property, and which, in truth, but for the tact and energy displayed in taking steps for its protection by, on the one hand, the Fire Brigade and on the other by the gang of outdoor men of the Gaslight and Coke Company directed by Mr. G. F. L. Foulger, the Company's Distributing Engineer, would have been in a perilous position.

Without desiring to minimize the seriousness of the occurrence by divesting the story of the verbiage with which it has been enveloped in the daily press, the facts are these: Messrs. Waring and Gillows were engaged on the site of the old Bath Hotel adjoining Walsingham House (which was also in process of demolition) in making a large excavation for a basement in connection with the projected Ritz Hotel, with its cellerage and collonade. For the purpose of the work in progress, an immense crane was fixed on a wooden staging. It appears that early on Wednesday morning—soon after six o'clock—the contractors' men set light to the boiler fires, with the object of starting the crane. The men left the staging directly the fires were alight; and fortunately for them they did so, for immediately afterwards the staging collapsed, and precipitated, with a tremendous crash, the crane and boiler below. In its descent the ponderous machine knocked away some of the timber framing which was supporting the roadway preparatory to a retaining wall being built. Among other damage, the arm of the crane broke a 6-inch gas-main; and large quantities of earth at the same time fell into the basement. The escaping gas ignited; and this was the commencement of the further mischief that caused so much commotion. It is a moot question as to what really ignited the gas. The cable of the Westminster Electric Supply Corporation was also mixed up in the damage wrought; and it is known that it fused. Whether, however, the gas caught fire by the short-circuiting, or by the burning coal from the boiler, we do not suppose anyone can speak positively; and therefore the chances of the point being cleared up are very remote.

The events which led to the climax of the peculiar occurrence, which will long be remembered by those who witnessed it, gradually succeeded the fall and the first outbreak. The Fire Brigade were quickly on the spot; and, in attempting to extinguish the flames, the soil was relieved of the support it previously had, and rapidly fell away in large masses. An 18-inch main on the road side of the 6-inch one acted as a girder for some considerable time; but—probably owing to the heat from the large gas-flames proceeding from the ends of the 6-inch main melting the lead in the joints, together with the great strain caused by the tremendous weight above—it also collapsed, and about the same time (this was near nine o'clock) a 4-inch main gave way. Something like 80 feet of the 18-inch mains were disconnected and displaced. The result was that the great quantities of gas issuing from the ends of the three mains (computed at about ½ million cubic feet per hour) were blazing away together. To adequately picture the spectacle in words cannot be done. There was the extensive chasm formed by the basement and the falling away of the roadway of some 80 to 100 feet in length, and about 15 feet wide to the commencement of the basement, and perhaps to about the latter depth. This was literally filled with a body of flame, which rose 20 to 30 feet. Some accounts state to 90 feet, but this was a mistake. There was flame at times at something like that height, but it was not continuous flame. In consequence of the enormous quantity of gas which was issuing from the mains not having time to be properly consumed, pockets (so to speak) of gas were formed, and floated away in fiery clouds to a considerable height—having what might be imagined would be the appearance of moderate sized fired gas balloons. At a distance, in the early stages, the reflection in the large plate-glass windows of the shops on the other side of Piccadilly gave the impression that there were two immense fires burning. Having regard to the menace occasioned to the adjacent property by the floating portions of the flame and the heat, the men of the Salvage Corps in attendance quickly covered the parts of the buildings which were in danger with fire-proof tarpaulins, and on to these large streams of water were turned in order to keep them cool. Of course, all traffic through Piccadilly was suspended; and a large force of police were required to keep the crowd a considerable distance from harm's way. Notwithstanding the time that elapsed before the flames were subdued, it points to the effectiveness of the steps taken by those responsible to the public and the Gas Company to be able to write that the surrounding buildings were not, so far as can be seen, damaged in the slightest, nor was there a single explosion, and no one was injured. The report issued from the Fire Brigade headquarters tersely sums up the damage by fire, heat, and water as being confined to "some building material and a watchman's box;" together with, through these and the other explained causes, about 60 feet of electric cable, the three gas-mains, and the roadway. Expert opinion is that had it not been for the heat of the flames from the 6 inch gas-main melting the joints (of course, the firemen could not extinquish the flame by water), the 18-inch gas-main would, for the length it was exposed and unsupported, have acted safely as a girder.

Some adverse criticism has been made by inexperienced writers in the daily papers as to the hours that passed before the flames were finally subdued; and the time has been unwarrantably exaggerated in certain prints. No consideration is paid in some of these daily paper accounts to the time when the issuing gas and flame from the 18-inch main was got under control, and when the whole of the half-dozen points of escape and burning were completely closed. The first accident, be it remembered, which was the origin of all the subsequent mischief, occurred early in the morning; and so far as the gas-flames were concerned, it was then really insignificant compared with what happened after the unexpected collapse of the 18-inch main, which did not occur until nearly three hours later. Mr. Foulger was immediately summoned by telegram to the scene of the disaster, on the greater accident occurring; and he was not long in reaching the place—having, it was soon seen, first made provision for the prompt attendance of large gangs of men, armed with tools and connections of every description that were likely to be required. The compliment must be paid to the staff of the Company that, when once apprised of the serious mishap, they turned out with their equipment with a smartness that deserves the fullest praise.

The difficulties and dangers of the situation were not so superficial, nor the methods by which they could be surmounted so easy, as those seem to imagine who are unacquainted with Subterranean London, and have little knowledge of what gas is capable of doing under such circumstances. No repetition of the Tottenham Court Road disaster was desired; and the utmost vigilance had to be exercised. Mr. Foulger's decision on inspection was that it was better to adopt fairly certain measures than to attempt any heroic treatment to suppress the flames which might result in waste of time, explosion, loss of life, and damage to property. In fact, the only safe course was to open the roadway on each side of the fractured mains, and cap them back—leaving the gas burning meanwhile. It was necessary to open out upon the mains as near as possible to the point from which the gas was alight in order to minimize the distance within which an explosive mixture was likely to form at the moment the gas was being extinguished, which might produce an explosion, on a large scale, after the manner of the little flash-back which one gets when extinguishing a gas-fire. In consequence of the character of the roadway—the surface being laid on a bed of thick rock-like concrete—it naturally took some considerable time to make the openings. The number of men who could be put on the work of effecting an entrance through the concrete of the dimensions necessary to get to a gas main was, of course, limited; it was no use opening more roadway than was necessary, though a bigger display in this respect might have given greater satisfaction to the reporters of the daily press. However, as soon as this difficult part of the work was accomplished, the 18-inch main was drilled at both openings; and, in each, two gas-bags were inserted. But, by Mr. Foulger's instructions, they were not inflated so as to fit tightly, but were left just sufficiently loose to maintain a pressure of, at a rough estimation, two-tenths so as to feed the flames. On this being done, the flames were, of course, immediately brought down to a low point. Then, by arrangement, the firemen suddenly turned the full force of their hoses on the burning ends of the pipe—not so much for the purpose of extinguishing the flame by water as to do so by concussion. It had this effect; in fact, it blew out what little gas there was in the open portions of the pipe. In this way, was prevented what might have been a dangerous explosion. [Reference is made elsewhere to the criticisms in the daily press regarding the length of time before the flames were extinguished, and the methods suggested, in ignorance, by which the responsible and experienced might have effected the object sought in a more expeditious manner.] However, the 18-inch main having been successfuly dealt with, the two smaller ones were taken in hand; and they soon succumbed to the attentions of the Company's men. By half an hour after noon, the difficult and hazardous task was accomplished, without any further injury than the, for such an occurrence, insignificant amount already quoted from the official report.

Only those who saw the tremendous character of this unusual gas fire can appreciate what an alarming thing it was to have to deal with. To direct and to carry out the needful operations so close to the heat of a blazing furnace required cool, tactful heads, and a knowledge of the dangers that were imminent and the means of avoiding them. Eulogy and not suggestive phrases amounting to censure was the due of those who so successfully carried through the task. It must not be forgotten, too, that there was not only the mechanical carrying out of the work on the spot that had to receive attention, but consideration had to be given to the making of arrangements to see that the surrounding consumers were not affected. An 18-inch main going through an important neighbourhood like Piccadilly must be doing important work; and while the active steps were being taken which had for their object the making of two dead ends in the main, compensating arrangements had to be carried through very hurriedly to take up the consumption in the surrounding area. From the time that the Gas Company's Distributing Engineer and his men took the work in hand to the time that the fire was quenched, no constant observer can fairly say that a minute was lost. There was a further small outbreak of fire, caused by a leakage in the 18-inch main, early in the evening; but this was of little consequence, and was quickly settled.

DEVONPORT CORPORATION GAS UNDERTAKING.

Some discussion took place at the meeting of the Devonport Town Council on Thursday respecting the supply of gas, as to which numerous complaints have been made in the local Press and elsewhere.

Dr. G. T. Rolston said that nearly everyone was complaining of the poor quality of the gas; and Mr. J. Goodman, endorsing this, urged that the needs of present consumers should be considered before any further developments into fresh districts took place. Mr. W. Hornbrook, the Chairman of the Gas Committee, said the question of the supply of gas was causing the Committee great anxiety. They knew they were not making gas enough to supply the town, and they could not do so under present conditions. The Gas Company knew this, or they would not have gone to Parliament for power to raise further capital and extend the works. They could now dispose of millions of feet of gas more every week, if they could afford to increase the pressure. Their returns showed an increase of only 5 per cent., where it ought to have been 15 per cent. if they had only had the gas to supply. The fault did not lie with the Gas Committee. It was solely due to the fact that the demand had more than overtaken the means of supply. They were driving everything to the utmost now, and would shortly

ask the Council for power to erect a water-gas plant which would be of temporary assistance, and would enable them to afford a better supply next winter. In the meantime, if any accident occurred which led to difficulties in connection with the supply, the Council must not blame the Committee, who were doing their best. A new gasholder and purifying-house were being erected, and altogether contracts had been let for £30,000 in connection with extensions of the works.

Another matter referred to was the laying of a main to a road called West Park, in one of the new suburbs of the borough. The Committee had been petitioned by the inhabitants to lay the pipe, but had declined on the ground that the probable consumption would not warrant the expense. Mr. Short, a member of the Council resident in the neighbourhood, contended that the Corporation were bound by their agreement with the added district to undertake the work, and referred to the inconvenience and danger to which the residents were subjected under present conditions. Mr. Love complained that the main had not been extended in another part of the district known as North Prospect. Mr. Hornbrook said the Committee considered in both these cases that the smallness of the number of residents did not justify the expenditure necessary. The Council, however, referred back to the Committee the minute relating to West Park.

The question of the conditions under which gas is supplied to the Military Authorities was referred to in the minutes; the Borough Treasurer having asked for instructions with regard to a reduction of 15 per cent. from the War Office account for gas since Jan. 1, 1902. The Committee instructed the Borough Treasurer to take steps, under the guidance of the Town Clerk, to enforce payment of the balance due to the Corporation. Mr. R. H. Rendle asked for information as to this minute, and said he understood at the time of the passing of the Corporation Gas Act that it was agreed the War Office should be allowed 15 per cent. discount, the same as the Admiralty. The Town Clerk said the easiest explanation was that under the statute there were provisions for the protection of the War Department; but they had to comply with certain conditions, which they had not yet done.

PROJECTED GAS-WORKS EXTENSIONS AT OLDHAM.

The question of renewing a portion of the plant at the Hollinwood gas station of the Oldham Corporation has lately been under consideration by the Gas Committee, who have had submitted to them a report on the subject by the Engineer (Mr. Arthur Andrew). One of the retort-houses at this station contains twenty ovens, ten of which have now been demolished, after having been in use between twenty and thirty years. These retorts were of an old type, direct fired. The Committee have not yet decided whether to put in horizontal retorts and power stoking machinery or inclined retorts; and they have instructed that tenders be obtained for both types before coming to a determination. It is also intended to put down coal and coke elevating and conveying plants. Whatever type of retorts and other plant is now decided upon, will at a later date be extended to the other half of the retort-house. The total carbonizing capacity of the existing retorts at Hollinwood is 2½ million cubic feet per day; and there is also a carburetted water-gas plant at this station capable of producing a million cubic feet per day.

GAS PURCHASE QUESTION AT BARNARD CASTLE.

As was briefly announced last week, the ratepayers of Barnard Castle, at a very full meeting, have by a large majority disapproved of the application by the District Council to Parliament for power to purchase the undertaking of the local Gas Company. The Company themselves are seeking statutory powers; and this vote of the townspeople should (as there is no intention of taking a poll) pave the way for an agreement between the parties, without resort to a big fight in Committee. Many interesting particulars regarding the points in dispute between the Council and the Company are contained in "Some questions the ratepayers of Barnard Castle are asking, and the Gas Company's answers thereto," which were printed and circulated by the Company in view of the ratepayers' meeting.

As readers are already aware, the fight has been about the conditions under which the Company should be allowed the use of the streets. Formerly, the Company opened the streets and then made them good again; but the Council, thinking the roads were not properly reinstated, subsequently undertook to do this work themselves, and charge the cost to the Company. In 1900, they sent in an account to the Company for work so done; but when asked for particulars so that it might be checked, they could not supply them, and consequently the claim had to be dropped. In the following year, another bill for £70 odd was sent in; but this the Company refused to pay because, besides charges for water and repairs, which were not objected to, it contained an item amounting to £34 for "opening out," which was subsequently explained to be a "licence for opening." The Council did not invite the Company to agree to this charge instead of the existing arrangement, but claimed that it was according to agreement. This statement the Company challenged; and the Clerk then said it was in pursuance of a resolution passed by the Council two years earlier, of which the Company had not been advised. Naturally, the Company objected to the payment of this "licence;" contending that it could not be legally demanded, and that Parliament had constantly refused to recognize such an exaction. It was, of course, not a question of amount that was involved, but of principle; and the same objection applied to the proposal to charge "way leave." When challenged, the Council's advisers were unable to produce any authority for the suggested impositions, and so the idea was dropped. The Company frankly admit that the Council have complete control of the streets; but they point out that the manner in which this control has been exercised has rendered it absolutely necessary for them to seek statutory powers if they are to continue to carry on business at all. Owing to the fact that the Council would not allow the Company to open the streets without first submitting to the arbitrary terms suggested, many would-be consumers have, it is said, been kept waiting for a gas supply; while for the same reason is has been impossible to stop leakages from the mains. It appears that the Council have never asked the Company to sell their works, nor do the Council ever appear to have discussed the question. Attention is next turned to the dividends. The Company state that they have for many years paid less, and never more, than 10 per cent. on the old shares, which is what Parliament usually allows on old capital, that has run all the risks attending the floating of a company in the early days of gas lighting. In 1902, the nominal capital was increased; but this makes no difference to the dividends, as the shareholders, instead of getting 10 per cent. on £100, receive 5 per cent. on £200.

It is next pointed out that it does not necessarily follow, because the works have been a good investment for the shareholders, that it would be a good thing for the town to possess them, for the Company would have to be bought out compulsorily. This meant that, besides having to pay full value for the works, the Arbitrator would award a considerable sum in respect of a forced sale; and the costs of obtaining the Act, of the arbitration, compensation to displaced officers, &c., would also have to be added. The prospects of the purchase of the undertaking resulting in a charge on the rates are then discussed; and it is argued that there would be small chance of the works being better managed by the Council than they are by the Company, inasmuch as members come and go, and often possess no experience of such management, whereas the Directors have proved their fitness by the success of the concern. Under their Bill, the Company will be limited to a price of 3s. 6d., subject to discount, in the town, and 4s. 6d. outside; while the Council proposed a charge up to 4s. inside and 5s. outside.

With regard to the financial side of the matter, the Company state that the figure of £15,000, which has been named as the probable price, is quite a minimum one, for the works alone; but even then the cost of a double contest in Parliament would have to be provided. The next question and answer may be given in full. "It is stated that £15,000 could be repaid in forty years by an annual payment of £350. Can this be done?—This statement is obviously the result of a clerical error. Under the best conditions of borrowing, it would take 5 per cent. upon the £15,000—*i.e.*, £750 per annum—to pay interest and repayments in forty years. Assuming that the gas works never made a less profit than this, which is a very unsafe assumption, there would even then be nothing left for the relief of the rates all that time; and directly there was any fall in profit, a burden would come on the rates, or the price of gas be increased. To avoid a charge on the rates, it must be assumed: That there would be no reduction in gas consumption; that there would never be any increase in cost of production (dearer coals, &c); that there would be no losses by accidents, leakages, &c.; and that there would be no competition of electric or other lights for forty years—which is, of course, a very bold and dangerous assumption. But as £15,000 does not represent the actual value of the Company's undertaking, and the costs of obtaining powers would also further increase the amount, a deficiency might be expected from the first, in the hands of the Council."

The document contains many more equally convincing statements; and it may safely be surmised that its circulation had not a little to do with the emphatic rejection of the Council's proposals at the ratepayers' meeting.

Last Thursday, a meeting of the shareholders of the Company was held for the purpose of approving of the Bill above referred to, for the dissolution and reincorporation of the Company with statutory powers. The Chairman (Mr. R. T. Richardson) briefly detailed the facts leading to the necessity for taking the step. The Council had, he said, insisted upon the Company paying a licence for breaking into the streets, and, without payment, had refused permission to open the roads for repairing pipes, &c. The Company therefore felt compelled to apply to Parliament for statutory powers, to remedy this state of affairs. The Bill [the provisions of which were indicated in the "JOURNAL" for the 5th inst., p. 19] having been read, the Clerk to the Council (Mr. J. Ingram Dawson) said he must take exception to a statement which had been made that the wayleave for existing pipes was an illegal charge, for he had now authority for such being made. The licence, he maintained, was asked for on the undertaking of the Chairman that the Company would pay 1s. a yard for opening up the roads. The resolution adopting the Bill was passed unanimously,

The Proposed Water Supply for the Torpoint District.—For a long time past, the St. Germans Rural District Council have beenconsidering suggestions for the provision of a supply of water for the Torpoint district, in which the Admiralty propose to erect large establishments in connection with the naval works at Devonport. Mr. G. R. Strachan was engaged as Engineer; and he prepared a scheme applicable to the whole district, including the borough of Saltash, which was invited to join in carrying it out. The matter has dragged on for a long time; and at a meeting of the Rural District Council on Thursday, a letter was read from Mr. Strachan, intimating that unless the Council came to a decision, he was no longer prepared to continue as Engineer. A letter was also read from the Local Government Board, in which it was pointed out that there was no legal authority empowering a Rural District Council to incur expenditure in connection with the promotion of a Bill, and expressing the opinion that it would not be a legal charge upon the rates for the Council to pay any amount to the Saltash Town Council in the event of their making application to Parliament. The Local Government Board also said that as any such agreement would be made without legal authority, they could not properly issue an order declaring the amount to be chargeable as special expenses upon certain of the parishes. Under these circumstances, the Rural District Council decided not to proceed with the matter, and to inform the Admiralty that the land in which they are interested will, after the 15th of April, become part of the newly-formed Torpoint Urban District. Several members expressed regret that the matter should have gone on for so long and come to such a conclusion, when, in their opinion, a comprehensive scheme was needed for the district.

PUBLIC LIGHTING OF WINDSOR.

Electricity Adhered to.

The Lighting Committee of the Windsor Town Council, after careful consideration of tenders sent in by the Electrical Installation Company and the Gas Company, for the lighting of the town during the next five years, decided to recommend the acceptance of the former Company's offer. On the matter coming before the Council last Wednesday, however, considerable opposition was shown to the proposal, though in the end it was carried. In the course of the discussion, a letter from the Ratepayers' Association was read, in which it was pointed out that during the past five years, when electricity had been in use, there had been an extraordinary increase in the cost of public lighting; the total amount paid having been £6829, as compared with £3799 for the preceding five years, which represented an extra expenditure of about £600 per annum. The letter went on to say that, in spite of this large additional outlay, many and continuous complaints had been made about the lack of light from the smaller lamps all over the borough; and that if no improvement was apparent in the ensuing five years, it would be the duty of the Council to adopt some other system of lighting. The offer of the Electricity Company was to light 10 2000-candle power and 21 500-candle power arc lamps, and 260 32-candle incandescent lamps for £1375 a year; while the Gas Company's tender worked out as follows: 247 lamps with one burner of 70-candle power, at £3 6s. 10d. each per annum—£815 2s.; 25 lamps with three burners of 360-candle power, at £7 each per annum—£175; 10 lamps with four burners of 480-candle power, at £8 per annum—£80; total, 282 lamps, £1070 2s. There would, however, in their case be an extra charge of 4s. per lamp per annum (or 1s. 6d. per lamp if the Council would excavate and make good the trenches in roads and footpaths) for the replacing of the gas-standards, which were removed in 1900, on condition that if they were again required the cost of refixing would be borne by the Council.

Mr. SHARP said that, as a member of the Lighting Committee, he moved an amendment in committee that the tender of the Gas Company be accepted. He considered it would be the most equal distribution of light over the town; and they would get 3500-candle power more, at a less cost of £220 per annum than from the Electric Lighting Company. In place of the existing inefficient lighting in the side streets and roads, the Gas Company said they would give 70-candle power lamps, and 360 and 400 candle ones in the main streets, which would be quite ample. In the interests of the ratepayers, therefore, and considering that the difference meant a 1d. rate, he must move an amendment that the tender of the Gas Company be accepted.

Mr. BRESSEY said that, as the one who seconded this in committee, he felt it his duty to second it now. It was a question of the utmost importance when £220 a year could be saved. For five years they had been in semi-darkness in the outlying streets; and even those interested in the Electric Light Company admitted it was a failure. In lieu of a nominal 16-candle power, they would have a 70-candle power lamp, which would light the streets, and would be a credit to any town. It was not going back, but forward, to accept the gas tender. They knew of the bogey of breaking up the roads, that would deter some from voting on this question; but during the last five years the Electric Light Company had been tearing up the footways, especially those asphalted, and thus causing irretrievable damage.

Alderman CLARKE remarked that, supposing the electric light tender had been within a few pounds of that of the Gas Company, he would have strongly supported it for the sake of not breaking up the roads. But what would 32-candle power lights be in the streets? What were they to attract people to the town? They were putting two such lights in place of one, at a cost of £200 a year, which meant for five years £1000 out of the pockets of the ratepayers, for a light that would be overdone in one part of the town, and underdone in other parts which required more light because there were no shops. In London, incandescent gas-lights were being used; and an oil installation was being put down in the new approach to Buckingham Palace, by command of the King. Liverpool was going back to incandescent gas-light; and so was Reading. It was a far better light on foggy nights. He was not asleep to the merits of electric lighting indoors; but for outdoor illumination there was no question but incandescent gas was pre-eminent. He hoped the matter would go back to the Committee.

Mr. RYLAND said the Electric Lighting Company offered, in place of the single 16-candle lamps, a 32-candle light divided into two, with reflector. This, however, would not magnify 32-candle power to 70, which was offered by the Gas Company for one incandescent gas-light. It was a fraud on the ratepayers to give so much as 20,000-candle power in High Street, Thames Street, and Peascod Street, and only 18,000 candles for the rest of the town. He would support the amendment for the acceptance of the tender of the Gas Company.

Sir J. SOUNDY pointed out that the Gas Company proposed to give the three streets named lamps of a total illuminating power of 4500 candles, in place of the present 20,000 candles; and he asked if anyone imagined that less than 25 per cent. of the existing light would be sufficient for the area.

Mr. DYSON supported the recommendation of the Committee. There was one thing, he thought, they might do. He suggested that in High Street a 500-candle power electric lamp should be put up. [A MEMBER: That was done, and was a great failure.] Anyone who went about would admit that the incandescent electric lights were not perfect. If the electric lamps were out, so much was stopped from the payment. By their tender, the Gas Company proposed putting out the big lamps at 11 o'clock, whereas the electric arc lamps were continued till 11.30; and it was advantageous to have the extra half hour. As to the electric lighting tender, it was £22 less than last time, and there was an increase in the lighting by 4660-candle power.

After various other members had stated their views, the amendment was rejected by three votes to eight; and it was subsequently agreed that the electric light tender should be referred back to the Committee, to arrange for a more equable distribution of illumination.

A VICTORY FOR GAS AT LEAMINGTON.

Electricity Superseded at the Winter Hall.

After having given careful consideration to the matter, the Pump Room Committee of the Leamington Town Council recently decided to recommend that the Winter Hall should be lighted by means of 600-candle power Lucas gas lamps (the cost of installing which was estimated at £30), in place of electricity, at present in use.

On this determination coming to the knowledge of Mr. F. W. E. Jones, the Engineer and Manager of the Midland Electric Light and Power Company, Limited, he addressed a pathetic appeal to the members of the Council, in the hope that they might be induced to withold their sanction. He pointed out that his Company had supplied this lighting for some sixteen years; that within the last three years the Company had spent many thousands of pounds to ensure a reliable supply of electricity to the building and the rest of the town; and that if they lost the lighting of a large place like the Winter Hall, without securing compensating business elsewhere, they would suffer great damage. He further submitted that the proposed "retrograde step" was unnecessary, as the Company had been able to show the Committee how, at the existing price for current, and by the use of modern lamps, 60 per cent. and more of the cost of lighting the hall could be saved. Rather than lose the lighting of the building, however, the Company were willing to supply it at the same special rate that they had conceded to the Free Library and Technical School, which would "bring down the cost of lighting by electric light to a figure but little above that claimed for the gas-lamps." The letter concluded with the expression of the hope that the Council would come to a favourable decision regarding the Company's claim for consideration, either by resolving that the Winter Hall should continue to be lighted by electricity or by granting the Company some street lighting as compensation for its loss.

In moving the adoption of the report of the Pump Room Committee which contained the recommendation referred to, at last week's meeting of the Town Council, Alderman Overell said the lighting of the Winter Hall was a subject to which the Committee had given a great deal of time and attention. The Electric Light Company had put up some very nice arc lamps there; but the Committee considered they were better suited for street illumination than for indoor lighting. The Gas Company then put up some Lucas lamps, which gave a very nice light indeed; and the difference in cost, as compared with the electric light, was very great. The cost of gas lighting was only 6d. per hour—a sum which the Company pledged themselves should not be exceeded. The Electric Light Company had also put up some small Nernst lamps; but the illumination from the gas-lamps was at least as good—indeed, some members preferred them—and the cost was less. He considered that the decision given in the report was the best they could have arrived at in the interests of the Corporation and the public. Mr. Morris said he was glad to see the Committee were studying economy with regard to the lighting of the Winter Hall, believer in the electric light though he was. Mr. Cashmore asked whether, during the time the Lucas lamps were in use at a recent bazaar, the meter was checked; and also whether the Committee could give them any opinion as to what the lights actually cost. It should be remembered that when the mantles depreciated, the light would not be so good. Mr. Barrett said the Committee did not begin with a preconceived idea that gas was going to be better than electricity. They had paid three different visits to the Winter Hall when the lamps were lighted, and at the last meeting were unanimous in the opinion that the gas-lamps gave a much better light. But this was not the only thing they took into consideration. There had been many complaints about draughts in the hall; and with the gas-lamps the atmosphere would be warmed and cold draughts prevented. He did not say that the lamps were always going to maintain their present brilliancy, unless they frequently put on new mantles; but the cost of these was only 8d. each, which would not involve any serious addition to the expenditure. The Committee had found that the great cost of the electric light acted as a deterrent to people who wished to hire the hall for concerts; and if they could get a good light at a lower price, they could let the place more frequently. Mr. Johnson remarked that the enormous expense of electricity was one of the chief considerations that influenced the Committee. The Engineer stated that the cost of electric light would not be more than 2s. 6d. per hour; but they preferred to take the matter from the practical point of view, and found the actual figure was nearer 4s. 6d. per hour. With gas, they would be able to let the hall at the full price without making an extra charge for lighting. Alderman Overell, in reply, said that the Lucas lamps had been tested, and it was found that the cost of lighting by them did not exceed 6d. per hour.

The report was agreed to.

Slot-Cookers for Liverpool.—Messrs. John Wright and Co., of Birmingham, have, in competition with a number of the leading gas-stove makers, just secured the contract to furnish, for the next three years, the entire supply of slot-cookers to the Liverpool United Gas Company. The Gas Company have recently decided to fix, free of charge, a slot-cooker in connection with their automatic meter supplies; and a very considerable demand is anticipated. The cooker selected has been manufactured specially with a view to meet the requirements of the industrial classes.

Gas Unharmed by Electricity at Elland.—It is stated that, despite the competition from electricity, and the fact that the local mills and factories are suffering greatly from depression in trade, the consumption of gas at Elland during the past year reached a higher figure than ever. "No doubt," says a local paper, "this record is largely due to the enterprise of the Gas Company, the Directors and officials of which are sparing no effort to make headway, especially in the way of utilizing gas for cooking purposes, and encouraging the use of incandescents. A new line is the letting out on hire of lamps to place outside tradesmen's establishments to light up windows."

FATAL GAS EXPLOSION AT EASTBOURNE.

A gas explosion, which unhappily caused fatal injury to a woman named Anne Knight, 89 years of age, occurred on Monday afternoon of last week in Beamsley Road, Eastbourne. An escape of gas had been suspected in the street; and the Gas Company had sent a man to locate it. While he was working in the road, a loud report came from one of the houses, among the residents in which was the old woman referred to. She was at the time of the accident walking from the front room to the scullery; and as the result of the explosion she was wedged between the floor boards, and so seriously injured that she died four hours later. The house itself was badly damaged. It seems that for some weeks past the Corporation have been engaged in laying a 27-inch surface-water sewer in the road, which necessitated an unusually wide trench; and owing to the road having been formed of made-up material, the subsidence was greater than is usually met with in work of this kind. The evidence given at the subsequent inquiry certainly pointed to this as having been the cause of the accident.

At the Coroner's inquest, Mr. H. H. Coles, who watched the proceedings on behalf of the Gas Company, said he had been specially requested by the Directors to express their sincere regret at the lamentable accident, and their deep sympathy with the relatives of the deceased. William Knight, a son, stated that he was upstairs asleep at the time, and heard nothing of the explosion. For several days he had perceived a smell of sulphur in the road, but, previous to the day in question, not in the house. Another witness said she saw the Gas Company's man go into the middle of the road and commence work with a pickaxe. "He hit something, and it shot straight through the window" of the Knights' house. She then heard the noise of the explosion. Questioned by the Coroner, witness said she did not see any light before the explosion; but when the man put the pick into the ground, there was an explosion like a cannon. Edward James, who was searching for the leak, said he made a hole with an iron bar close to the pavement opposite the front door of the last witness's house. He could not, however, detect the smell of gas in the ground; and while he stood looking across the road, the explosion occurred. Another man in the employ of the Company said he received instructions from Mr. Ball to call on the previous Saturday at all the houses in Beamsley Road, to inquire whether any of the occupants had complaint to make as to an escape of gas. He did so, including the house where the explosion occurred, but failed to hear that any escape had been detected. The Foreman of the Jury remarked that this was very satisfactory, as it showed that the Gas Company took all reasonable steps to ascertain where the escape was.

A clearer light was thrown on the affair by Mr. W. J. Ball, the Gas Company's Outdoor Superintendent, who said he had received five or six complaints of leakage during the time the Corporation had been at work in Beamsley Road. As a result, three service-pipes had been relaid, and a similar number of fractures in the main had been repaired, besides other smaller items. On the Saturday preceding the explosion, he inspected the trench which the Corporation had made for the purpose of laying a new surface-water sewer; and he thought it would give him trouble. The effect of the trench would be that the soil would subside, and carry with it the service-pipes. He had since made an examination of some of these pipes; and they had now all been cut off at the main. The particular piece of pipe which the Coroner and Jury had inspected was undoubtedly sufficient to cause the explosion. The nature of the soil would easily allow the gas to escape under the house. The explosion was actually caused by the gas which found its way into the house becoming ignited at the fire in the front room. The Coroner remarked that it was unnecessary for him to point out to the Jury that their business was not to distribute responsibility between the Corporation and the Gas Company, though if there was evidence of culpable negligence, it would be their duty to take notice of it.

The Town Clerk observed that the broken service-pipe did not supply the house where the explosion occurred. So far as the Corporation and the Gas Company were concerned, they had no knowledge that any leakage was going on, for as soon as any complaints were received they appeared to have been attended to. Since the accident, the whole of the service-pipes had been abandoned, and a new main laid on the east side of the road; so that the inhabitants need have no apprehension of anything further occurring from any subsidence. In reply to Mr. Fovargue (who watched the proceedings on behalf of the Corporation), Mr. Ball said he would rather not express an opinion as to whether the leakage occurred through the construction of the trench. The Town Clerk pointed out that the Jury could insist upon a reply; but the Coroner said if it was given it would only be the witness's opinion. In answer to the Town Clerk, witness stated that all the service-pipes were new when they were laid in 1898. The Jury did not think it necessary to hear the evidence of the Corporation's foreman as to the way in which the sewer was laid and the trench filled in; and, after a brief consultation, they returned a verdict of "Accidental death;" adding that every credit was due to Mr. Ball for the inquiries he had caused to be made.

FATALITIES THROUGH INHALING GAS.

At the Stockton Police Station, on Monday last week, the Deputy-Coroner (Mr. Bertrand Watson) resumed the inquiry, opened on the previous Saturday, into the circumstances attending the death of Thomas Marley, a labourer, who resided with his son, George Marley, at 10, Mason's Court, Stockton, and was suffocated by gas the previous Friday, as already reported (*ante*, p. 101). The Town Clerk (Mr. A. B. Crosby) and the Gas Engineer and Manager (Mr. W. Ford) watched the case for the Corporation; Mr. A. H. Parkin attended on behalf of the deceased. George Marley, the son, said his father, who retired to bed at about the same time as he did, slept in a room off the kitchen, witness sleeping in one above. During the time witness sat in the kitchen, there was a slight smell of gas, which had been noticeable all the week; but it was not sufficiently strong to cause them any alarm. Witness paid rent to the Corporation for the house in which he lived. He found his father dead about 5.30 on Friday morning. In answer to Mr. Crosby, witness said the place in which his father slept was about 5 ft. by 6 ft. Mr. Crosby asked witness if it was not a fact that his father had been recommended not to use the place he occupied as being totally unfit for habitation. Witness replied that nothing had been said to him about it. Dr. G. H. Douthwaite said he thought Marley would have then been dead for two hours when he saw the body. Nine other people whom he visited were suffering from gas poisoning. Asphyxia arising from coal gas poisoning was, in his opinion, the cause of Marley's death. In answer to Mr. Parkin, witness said he had no reason to think that Marley would have died had it not been for the presence of the gas, nor was there anything about the smallness of the room to account for his death. Marley was a well-developed, well-nourished, robust man. Mr. Ford said the pipe from which the leakage took place was one replaced for another about six years ago on account of a subsidence. The leakage in this case was caused by a slight subsidence of the ground on the quayside, having the effect of wrenching one pipe from the socket of the other for about a quarter-of-an-inch. The first complaint about the escape of gas came to him about seven o'clock on the morning that Marley was found dead. The Jury returned a verdict that death was due to asphyxia, and that no blame was attached to anyone.

Shortly after eight o'clock on Tuesday morning, William John Horton (43), a coach painter's labourer, was found dead at his brother's house, 348, Bordesley Green, with a flexible gas-pipe in his mouth. The case was investigated by the City Coroner (Mr. I. Bradley), at the Victoria Courts, Birmingham, in the afternoon. Mr. F. A. Horton, brother of the deceased, said he smelt an escape of gas, and going into the kitchen saw his brother lying on the couch. He was dead, and a flexible pipe, used for connecting a gas-stove with the ordinary gas-fittings, was in, or close to, his mouth. Witness snatched the pipe away, removed a handkerchief from his brother's face, and sent for a doctor. Dr. Thomas, the medical man called in, said he found the deceased in such a position—with his head on the corner of the couch—that the gas from the pipe would suffocate him. When he turned the face round, there was a strong smell of coal gas. A verdict of "Suicide while of unsound mind" was returned.

The Hull Coroner (Mr. A. Thorney) held an inquest on the 12th inst. relative to the death of Sister Louisa, the sister in charge of the Church Extension Association, 21, Story Street, Hull. The Coroner stated that deceased was named Louisa Humphries, and was about 50 years of age. It appeared that during the past few days she had been suffering from influenza. She went to bed about 8.30 p.m. on Friday, and an hour later another sister went to the room door and asked if she required anything. Sister Louisa replied that she did not, and told the other sister she could not come in as the door was latched. About 6.35 on Saturday morning, Sister Stockwell rang the call bell; but as the deceased did not come downstairs, she sent the girl to the bedroom about seven o'clock. The room was in darkness, and the girl could get no reply. About 8.30 Sister Stockwell went up to the room, and heard deceased breathing heavily. There was a strong smell of gas; and as she could get no answer from deceased, she forced the door, and immediately threw open the window. Stimulants were administered, and Dr. Nicholson was sent for. Deceased was alive when he arrived, but died at 9.30. Dr. Nicholson said he found the sister lying in a small room in which there was neither fireplace nor chimney. The Coroner remarked that this was the trouble. The owner of the property was present, and stated that the room was not intended as a bedroom. Dr. Nicholson, continuing, said he tried to restore animation, and when he left deceased he thought she was recovering. Death, in his opinion, was due to asphyxiation by coal gas. Clara May Stockwell, nursing sister, also gave evidence in which she supported the Coroner's opening remarks. Deceased had lately complained of dizziness; and from the position of the body witness thought she had got out of bed to light the gas, and, after turning the tap, had fallen backwards. The Foreman of the Jury suggested that they should return a verdict in accordance with the medical evidence. The Coroner said he thought it was a clear case of accidental death; and a verdict to this effect was returned.

THE ELECTRIC LIGHTING QUESTION AT DORCHESTER.

The Dorchester Town Council had the electric lighting question before them again at their monthly meeting on Tuesday, on a recommendation in the report of the Lighting Committee that the application to the Local Government Board for their sanction to a loan for electric lighting purposes should be proceeded with. The Mayor (Mr. E. W. Kerr) moved the adoption of the report. Mr. Dennis asked what the object of the Committee was. As far as he could gather from the newspaper reports, the Committee were appointed to negotiate, or endeavour to do so, with some private company for the working of the electric light scheme. If this definition was correct, he submitted that by their report they had exceeded their power. The Mayor said the object of the Committee was not merely to deal with the matter of electric lighting, but with the lighting of the town in general. Alderman Allen thought that up to the present they had not been constituted a General Lighting Committee, and they had made no perambulation of the town to inspect the lamps, &c. They were appointed to negotiate on the clear understanding that they were not obliged to take up the loan. Mr. Wood Homer said it was understood that the Committee were appointed to deal with the lighting of the borough generally; and in proof of this, he cited the fact that at their last meeting they had resolved to ask Mr. Osmond, the Gas Company's Manager, to submit a plan for the better lighting of the town by gas. With regard to the subject of electric lighting, after careful consideration and diligent inquiry of different companies, the Committee had

come to the conclusion that, in the interests of the town, and in order to retain as much power as possible in their own hands, it would be better for the Council to proceed with the Local Government Board inquiry to obtain sanction to the raising of a loan; but, as Alderman Allen had said, it was without any idea on their part of borrowing the money for the purpose of installing the electric light at present. Mr. Bellinger strongly objected to the course proposed. They were told by Mr. Wood Homer that the Committee did not intend to go any further in the matter, and therefore he saw no object in the recommendation they had made. After some discussion, Alderman Genge asked whether the Council were in a position to give the necessary information to the Local Government Board's Inspector in the event of the inquiry being held. The Town Clerk replied that everything had been ready for two months. Mr. Tilney Payne proposed, as an amendment, that the clause in the report referring to the Local Government Board should be struck out. Mr. Dennis seconded the amendment. Mr. Young asked, in the event of the amendment being carried, what would be the position of the Town Clerk in relation to the Local Government Board. Would he give the Board the information they asked for? The Town Clerk answered that he already had the resolution of the Council to proceed with the application for sanction to the loan; but it would now be a most awkward position for him to go forward with the old resolution, passed at the October meeting. Mr. Tilney Payne at this point intimated his willingness to withdraw his amendment. The Mayor then put to the meeting the motion for the adoption of the report, without any qualification; and it was defeated by seven votes to five. Mr. Wood Homer asked where the Council were now. The Mayor said they were certainly stultified. Mr. Wood Homer remarked that the original resolution, upon which they now fell back, was very much stronger than the one negatived. The Town Clerk suggested that notice should be given to rescind the resolution passed in October. Mr. Wood Homer said this would be considered in Committee. The matter then dropped.

HEXHAM AND THE ELECTRIC LIGHT.

A long discussion took place at the last meeting of the Hexham Urban District Council, on the motion of the Chairman (Mr. William Alexander, J.P.)—"That the assent of this Council be given to the Provisional Order being promoted by E. P. Harvey, Esq., entitled 'The Hexham Electric Lighting Provisional Order.'"

In moving his resolution, the Chairman explained that he did so because he believed it was of paramount importance that the lighting of the town by electricity should be carried out by a different company from that which supplied the gas. It was highly desirable that they should have two companies competing against each other, with a view to getting the best light. The Electricity Company were going to supply them on lower terms than were found in any part of Northumberland. Under the Order, it was intended to light the whole town within two years; and there was a purchase clause by which the Council could acquire the undertaking if they thought fit. Alderman Stainthorpe, who supported the motion, remarked that, when the Gas Company were getting their electric lighting powers, he was opposed to them; and since then they had gone on increasing their monopoly. He was aware that, through the courtesy of the Gas Company, they had been informed that they had under consideration a scheme similar to the one proposed in the Order under discussion. He did not at all object to this; but at the same time it was one of the strongest reasons for obtaining the Order. They would see which system would most benefit the ratepayers.

Mr. Herbert Lees, who was the next speaker, said that, as the Chairman had reminded them, this was not the first occasion on which the question of electric lighting had been discussed by the Council. In 1900, when considering an application by the Northern Counties Electric Supply Company, the Council had a special report by the experts engaged to give an opinion upon the supply of electricity to the town. A careful study of that report would show why the electric light had not been introduced into Hexham before. Gas at that time was 3s. 4d. per 1000 cubic feet, subject to certain discounts which the report ignored. But the report proved that with gas at that price it was not possible for electricity at 6d. per unit to compete with it. Responsible experts said it was not possible to profitably supply electricity in Hexham at present at less than 7d. per unit. But the price of gas had now been reduced to 3s., with discounts of from 5 to 15 per cent.; and he would here like to point out that the terms offered to the Council (not exceeding 5½d. per unit for public lighting) were not better than were already given them, having regard to the price of gas. The Council were allowed a discount of 15 per cent., which was equal to more than 1½d. on a 7d. basis. Then the experts also ignored another factor—namely, the greatly improved lighting power obtainable by the use of incandescent burners. The experience of the Council in this matter ought to be of some importance in the consideration of the question before them. When they came to consider that during the whole of the past year the town was lit by means of incandescent burners, and that the lamps were alight every night, instead of as previously being unlighted for some five or six nights per month, what did they find? That the gas account was reduced by upwards of £30; and if the lamps had only been lit on the same number of nights as in the previous year, the reduction by the change would not have been less than £50, or something like 15 or 20 per cent., after allowing £14 for mantle maintenance. And in face of these facts they proposed to take up the first electric lighting company who came along. Who would be the gainers by the introduction of electricity in this way? The general body of the ratepayers would not benefit by it, and the working classes would not benefit either. They would naturally take the light that was cheapest. Of course, there were some persons who, irrespective of price, would use electricity. They should, however, remember that they represented the ratepayers, and among them the people in a small way of business; and assuredly they would not benefit by this introduction. The whole question needed fuller consideration.

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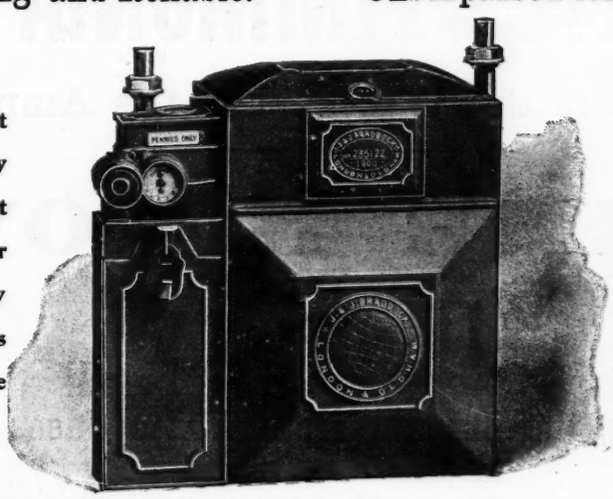

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How different all this was from what was done in the case of a Bill introduced some twelve months ago. At that time, the Council were considering a Bill of not more importance to the town than the Order now under consideration. It was then deemed necessary to appoint a Sub-Committee to deal with the Bill, and to supply every member with a copy of it. Why were all these precautions thrown to the wind on this occasion? Naturally the question suggested itself, where were those gentlemen of the Sub-Committee now? Some of those who were most prominent in opposing the Bill he referred to were now found associated with this Order; and an inference would naturally be drawn from this. It had not been thought necessary to read the Order even to them; and he doubted if more than one or two of the members had gone through it. It was said that the cost of the opposition to the Gas Company's Bill was light; but this was not the case. In conclusion, he said that the circumstances attending the promotion of the Order were such that he had no hesitation in voting against the resolution; and he believed that if the whole truth of the matter were known to the public, the Council would have a mandate to oppose it.

Mr. Ainsley remarked that Mr. Lees had made out a good case; and he almost felt that his was the correct position. Still, a little competitive light would be a benefit; and at the same time it would act as a spur to the endeavours of the Gas Company, and perhaps help them to modify their tariff. He was convinced in his own mind that a reduction of the Gas Company's charges would increase their consumption 20 per cent. In reply to a question put by him as to the purchase clause, the Clerk said they had not the option of acquiring the works at any time, but only at the end of 42 years. Mr. Congleton, while recognizing the fact that he was in a hopeless minority, maintained that the ratepayers ought themselves to secure any benefit that might be obtainable from installing the electric light in Hexham. The cost of the opposition to the Gas Company would be utterly thrown away if the Council did not take advantage of the present opportunity. He moved, and Mr. Lisle seconded, an amendment that the consent to the Order should be conditional on the Council obtaining similar terms to those offered them in 1900 by the Northern Counties Company.

In replying to the discussion, the Chairman congratulated Mr. Lees on the very able statement he had made, and said he could take every credit for the way in which he had advocated the claims of the Gas Company. But they could not, in that particular case, look upon him as a disinterested party. He regretted some of the statements that had been made by Mr. Lees, who had charged certain individuals with endeavouring to float the Electricity Company for their own ends. There was not a shadow of foundation for such a statement. The one idea was to support a supply of electricity for Hexham. So far as regarded the allegation that the matter had not been fully considered, he thought it had been carefully gone into. It had not only been considered on that occasion, but for years past. There was no need to go over it again.

The voting was then taken as follows: For the amendment, 3; for the motion, 4. One member did not vote. On being put as a substantive motion, all but two voted for it.

THE MARYLEBONE ELECTRIC LIGHTING MUDDLE.

The Electric Supply Company's Suggestion Rejected.

A Special Meeting of the Marylebone Borough Council was held on Thursday—the MAYOR (Rev. H. Russell Wakefield) presiding—to consider the Council's Electric Lighting Bill, and to receive a report from the Electric Supply Committee on the letter from the Metropolitan Electric Supply Company referred to them by the Council at their meeting on the 7th inst. (*ante*, p. 101). The report of the Committee was as follows:—

The terms of this letter are not always so clear as might be desired; but the Committee think they can be under no misapprehension in calling attention to the following broad principles involved in the offer. First, the Council are required to surrender entirely all the goodwill of the Company for the next 27 years. This was apparently valued by the Arbitrator at about £1,000,000 sterling. In return for this concession, the Council will gain only postponement for 42 years of the payment of the capital sum under the award. Secondly, the Company are to be secured in an absolute monopoly of the whole supply during the lease. The consumers will practically be at the mercy of the Company, as the only effectual check—that of possible competition—will be completely removed. Thirdly, the Company stipulate that the bonds to be given to them in payment shall have a priority over any subsequent debt of the Council. This will practically mean that the Council will be unable for 42 years to borrow any sum whatever, even for the most necessary local improvements. At all events, any such fresh loans would be of the nature of a second mortgage, and could only be obtained under the most onerous conditions. It will be observed that the Company propose only to pay a rent sufficient to cover the interest on the proposed stock. The Council would, therefore, have either to leave the payment of the whole sum to their successors, or raise an annual sinking fund from the rates. The amount of the sinking fund necessary to redeem the capital in 42 years would, on the 2¾ per cent. tables, be £15,765. The Committee understand that the sentence in the Company's letter referring to capital to be provided in respect of the period from Jan. 1, 1902, until the commencement of the lease, means that the Council should issue a similar stock for this amount, which is estimated by the Engineer at £124,250. On this point, however, the letter is not quite clear. The Committee further notice that nothing is said with regard to costs; and they take this to mean that the expenditure already incurred by the Council—about £60,000—will have to be at once provided from the rates. The Council will be bound, on the termination of the lease, whether on Dec. 31, 1931, or earlier in the event of competition being admitted, to purchase at an agreed price the whole of the fresh capital expended by the Company on so much of their Willesden works as the Company think fit to say is suitable and sufficient for the supply of Marylebone. It is estimated by Mr. Wright, from the figures supplied by the Company in the arbitration, that by the end of 1931 the capital required for this purpose, after allowing for depreciation, will be not less than £800,000. The Borough Council will be called upon to find this additional sum for buildings and plant in the design and erection of which they have had little or no voice, and would further be indefinitely tied to a system of supply which, as they have often

WALKER'S PATENT

SULPHATE OF AMMONIA PLANT

Recovers the WHOLE of the Ammonia.

SULPHUR RECOVERY PLANT

For Recovering the Sulphur from Waste Gases of Saturator.

FOR FULL PARTICULARS AND MODELS OF PLANT, WRITE

C. & W. WALKER, Ltd.,

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DONNINGTON, NEWPORT, SALOP.

London Office:
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reported to the Council, is in the highest degree uneconomical, and undesirable in the interests of the borough.

The MAYOR opened the business by calling attention to a letter he was sending to the electors in the borough, giving particulars in regard to the meeting of ratepayers to be held in the Queen's Hall to-night. He pointed out that the main object of the meeting was to obtain the consent of the electors, not their directions. The motion to be submitted would, therefore, be in favour of the Bill as a whole; but any elector would be able to move that a part or parts of it should be omitted.

After some conversation, it was decided to defer till the next meeting of the Council the formal approval of the Bill.

The Electric Supply Committee's report having been received,

Mr. E. R. DEBENHAM, the Chairman of the Committee, moved that the Metropolitan Electric Supply Company be informed that the Council regret their inability to accept the suggestions made in their letter of the 5th inst. He said it was obvious that the proposals of the Company meant that the Council should pay the amount of the award, and give up their profits for a number of years; but it was not quite clear what would happen with regard to new expenditure. He proceeded to discuss the terms offered, and said that one of the objections to their obtaining current from the Company was that the Willesden system was not one which the Council would think of adopting. If they accepted a proposal of this kind, they would either be obliged to take current in bulk from Willesden or to come to terms with them, or else to purchase the generating plant at Willesden. By making the bonds a first charge on the rates, they would be burdening them to the extent of £1,212,000, which would make subsequent borrowings still more expensive.

The motion having been seconded,

Sir E. GALSWORTHY offered some remarks on the Company's proposals, and concluded by condemning the Council as a totally incapable body for carrying on a commercial scheme such as the one before them. He expressed his aversion to the present or any other Bill, and added that the terms offered to the Company must be rejected.

Alderman ELGOOD endorsed these statements.

Mr. WHITE said the speech of Mr. Debenham had shown the deplorable state in which the borough was over this question. Nothing more disastrous than the acquisition of the Company's concern could happen. If they obtained their Bill, they would be entirely at the mercy of the Company. From the appointment of the Electricity Committee, the chapter had been one of blunder; and one of the troubles the borough was in now was through allowing the privilege to be lost of having their electricity generated within the district. He hoped that further overtures would be made after the meeting on Tuesday, when the electors by an overwhelming majority would have refused the Bill. Then the Council would be on top for the first time, and the Company would have to say what they would do.

After some remarks from other members of the Council,

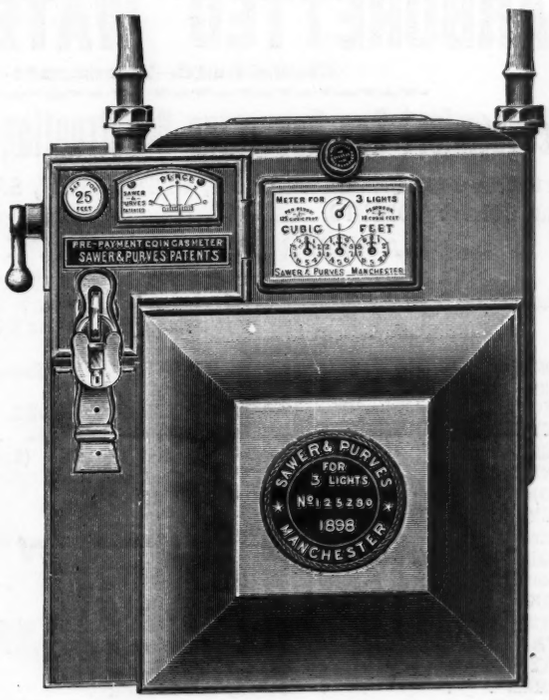
Mr. DEBENHAM replied, and the motion was carried.

UXBRIDGE WATER SUPPLY.

Suggested Improvements.

A Special Meeting of the Uxbridge District Council was held a few days ago to consider a report on the water supply of the area under the Council's control, and of the works connected therewith, which had been prepared by Mr. F. S. Courtney, M.Inst.C.E., who in October last was called in by the Council for the purpose of examining and reporting upon the condition of the works and supply. He visited the works and inspected the machinery in the company of the Surveyor (Mr. W. L. Eves), and he also had an interview with Messrs. Beasley, who have been working the plant on lease for the past three years. The report was a long document, covering the following points: (1) The condition and efficiency of the present machinery and plant. (2) The necessity or otherwise of new machinery. (3) The sufficiency of the supply. (4) The present method of furnishing the high-level service. (5) Reservoir accommodation. (6) The system of water supply generally. Having dealt fully with all these matters, Mr. Courtney makes various recommendations. He thinks that immediate steps should be taken to localize and stop waste; and that efficient pumping plant should be provided at once. He expects to reduce the daily consumption of water to 250,000 gallons, and this quantity he would arrange to pump in 12 hours by steam, or in 18 hours by electric power. He remarks that the alternative of working electrically has the advantage of costing less in the first instance; and as the load will be a day one so far as the electric light station is concerned, the Company should, he thinks, be able to put forward a definite proposal at a very low figure. The working cost with steam, including wages, coals, stores, and the allowance for repairs, should not exceed £480 per annum. It remains to be seen how electric current will compare with this. Mr. Courtney adds that, unfortunately for the electric current, in this case credit cannot be given for saving of initial expense in the size of buildings, chimney-shaft, &c., as these are already existing. In regard to the third point, as the district is circumscribed, he considers the present yield of water sufficient to meet demands for some time to come; otherwise he would recommend the complete removal of the works. As to the supply to the houses in the higher portions of the district, these are fortunately situated in the neighbourhood of the reservoir, which facilitates the question of dealing with them. Mr. Courtney would recommend transferring all houses of which the ground level is within 30 feet of the level of the floor of the reservoir, to the high service. For this service, he would provide for a raised tank of 75,000 or 100,000 gallons capacity; the bottom of the tank being at least 30 feet above the ground level of the highest site of any house to be supplied. The report having been considered at some length, it was resolved to ask Mr. Courtney to prepare and submit an estimate of the capital outlay required for his alternative schemes of pumping by steam or electricity, accompanied by a description of each, and the annual expenditure thereon.

THE ABOVE REPRESENTS THE SIZE OF OUR BUSINESS WHEN THE "POSITIVE" SLOT METER WAS FIRST MADE IN 1889



SAWER & PURVES,

MANCHESTER
AND
NOTTINGHAM.

IT HAS INCREASED IN RATIO TO THE ABOVE, SINCE THE POPULARITY AND PRE-EMINENCE OF THE "POSITIVE" SLOT METER BECAME PRONOUNCED.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The "Scotsman" of to-day contains the following report: "A meeting of the employees in the carbonizing department of the Granton Gas-Works was held last night, in the Moulders' Hall, High Street, for the purpose of protesting against the delay on the part of the Gas Manager and the Edinburgh and Leith Gas Commissioners in dealing with a petition for the remedy of certain grievances. That petition, which was drawn up and presented to Mr. Herring on the 30th of October last, asked for the fixing of a recognized day's work—that for chargers, drawers, and producer men the shift should consist of eight hours. The chargers pointed out the necessity of ventilating the charging stage, as the intense heat and the amount of work were beyond endurance. They asked, further, that fourteen ovens instead of sixteen should be the recognized day's work, with a break as at present, or that four men instead of three be put on each bench or section. The drawers also desired a reduction to fourteen ovens. They called attention to an article by Mr. Herring in the 'GAS JOURNAL,' in which it was stated that the men had only four or four-and-a-half hours' work out of the eight they were on duty; and it was pointed out that that included only the actual time for drawing and charging the round—no time being counted for preparing for the round, clearing stopped pipes and cleaning mouthpieces, picking the tar off the plates, and sweeping up the bench. Taking these duties into account, the men did from six to six-and-a-half hours' work last year; while this year the work was continuous, and left no time between the rounds to recuperate or take breakfast or tea. The producer men petitioned that the man taken away last year should be restored, so that they might have more time to attend to the furnaces. The petition also reminded the Engineer of his promise to deal with Sunday labour—that it would be done away with as much as possible when the works were removed to Granton. Seeing that it was impossible to abolish it in the retort-house, the men claimed double pay for Sunday labour." The report proceeded—"The Chairman of the local branch of the men's Union, who presided over a gathering of about sixty men, said that after the petition was lodged the Manager received a deputation from the men, whom he treated 'with a very high-handed piece of bluff.' He said he would take a ballot of the men as to whether they were in favour of Sunday closing, with the loss of the day's pay, or of the present system. That ballot, which was taken in the retort-house only, resulted in 113 voting for Sunday closing and 11 for the present system. Mr. Herring promised to lay the petition before the Gas Commissioners at the end of November. The men had received no information of that having been done. Another deputation waited upon the Manager, and he offered a concession of five retorts, whereas the men asked a reduction of ten—from 70 to 80. The Manager's offer meant only half-an-hour divided into ten parts, so that it was virtually no concession. He promised to introduce 'blowers to lower the temperature, but those introduced had been of absolutely no use. The men had then forwarded their petition direct to the Commissioners, and had received intimation that it had been remitted to the Granton Sub-Committee. Such treatment, the Chairman contended, was nothing but organized oppression. The employers were driving the men to extreme measures by their tactics, and then they would hold up their hands in horror if the men went on strike. A resolution was thereafter unanimously adopted protesting against the delay of three months in dealing with the men's petition; and it was agreed to forward a copy direct to the Commissioners. A worker said a few weeks ago the Manager got a big increase in his salary. Though it meant an expenditure of £300, it was all settled within a fortnight—the public knowing almost nothing about it; whereas a matter which affected the interests of the men, though it involved only a few shillings a week, was delayed for three months without being dealt with."

On reading this, there is a feeling that the men are exhibiting more impatience in the matter than is necessary. It is not unreasonable that time should be given to ascertain the best methods of working. Probably the men would willingly grant that, if they had not behind them the Union, whose policy, it almost seems, is to create difficulties where they do not exist.

The Gas Committee of the Dunfermline Corporation, at a meeting of the Town Council this week, have recommended that a report by Mr. Millar, the Burgh Auditor, upon the finances of the gas undertaking since it was taken over by the Corporation seven years ago, be printed and circulated among the members of the Council. Provost Macbeth objected to the printing of the report, on the ground of the cost. Mr. W. Robertson said the question was creating a great deal of interest in the town, and they must tackle it, if only to set the public mind at rest. The Gas Committee agreed to the printing of the report, with a view to their having a full dress debate upon the subject in the Council. Bailie Stewart said it was the fact that members of the Committee were not in unison with regard to the finances of the gas undertaking, and he was satisfied that it was their duty to come to a definite understanding in the matter. Mr. Blair expressed the opinion that the report of the Auditor would not set their minds at rest. The Council approved the recommendation of the Committee. It was not stated, but I suppose that the difficulty is that, since the gas transfer, the Corporation have erected new works and have sold the site of the old ones—the purchaser, by the way, being Mr. Andrew Carnegie, who was born in a small house still standing on a corner of it—and that the capital account has been thereby inflated beyond what it would have been. Mr. Millar is a most capable Auditor, and anything which he may recommend, it may be taken for granted, will be absolutely safe. I find that, with a total capital of £100,000, the Corporation have borrowed £102,282, including the capitalized value of annuities, and that they have repaid, or placed to sinking fund, £12,922. The £2282 beyond the authorized amount may not be actually correct; but considering the sum repaid and the flourishing condition of the concern,

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

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CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
BLACKBURN.	1,250,000	ST. CATHERINES (Remodelled)	250,000	ACCRINGTON.	500,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	TONBRIDGE	300,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	STRETFORD	500,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	OLDBURY	300,000
BIRKENHEAD	2,250,000	ST. CATHERINES (Second Contract)	250,000	TODMORDEN	500,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	YORK (Second Contract)	750,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	ROCHESTER (Second Contract)	500,000
HALIFAX	1,000,000	YORK	750,000	NEWPORT (MON.)	250,000
TORONTO	250,000	ROCHESTER	500,000	TOKIO, JAPAN	1,000,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	PERNAMBUCO (Brazil)	125,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	MALTON	150,000
MONTREAL	500,000	DULUTH, MINN.	300,000	DULUTH, MINN. (Second Contract)	300,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	BROCKVILLE (ONT.)	250,000
BELLEVILLE	250,000	LEICESTER	2,000,000	SMETHWICK	500,000
OTTAWA (Second Contract).	250,000	ENSCHEDE (HOLLAND)	150,000	GRAVESEND	300,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	NEWPORT MON. (Second Contract)	250,000
		BURNLEY	1,500,000	TORONTO (Third Contract)	750,000
		KINGSTON-ON-THAMES	1,750,000	TORONTO (Fourth Contract)	1,000,000

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft
MONTREAL, ONT. (Second Contract), 1,800,000 C. Ft. HAMILTON, ONT., 400,000 C. Ft.

there is no need for uneasiness on the part of anyone. The matter can be put right on the first occasion of the Corporation going to Parliament. It is not worth making a special application for it.

It was reported to the Arbroath Town Council on Monday that the quantity of gas made between May 15 and Nov. 30 was 1,968,400 cubic feet more than in the corresponding period of 1902, and that the quantity made per ton of coal carbonized was 9010 cubic feet—an increase of 174 cubic feet. The Gas Committee, in view of their recommendation to the Council of the 5th of August last, to take into consideration the amount of the salary of the Gas Manager when the extensions then in progress were completed, and also in view of the satisfactory completion of those extensions at an amount which was less than the Manager's original estimate, recommended that the Manager's salary be increased from £200 to £250, which was the amount paid to his predecessor. Mr. Robbie, in moving this recommendation, said that the difference between their position to-day and two years ago was £3400 in favour of this year. Of this sum, £2700 had been given to the consumers of gas, in the shape of a reduction of 10d. per 1000 cubic feet, and £750 had been put to a suspense account. As an illustration of how these advantages had been obtained, he would mention that £700 more had been earned for coke sold, £250 had been gained by the use of breeze for the raising of steam, and £600 had been saved in the cost of labour. Having, therefore, less to pay for wages, and having a larger income on account of the sale of residual products, they had been able to pay their way without overdrawing their account at the bank. For the four years previous to Mr. Young's appointment, their average annual overdraft was £90. This year they had money lying on deposit receipt which would give them an advantage on this account of over £100. He wanted to know if the gas consumers were getting the full benefit of the reduction; and he asked the collector to take a street and compare the consumption of gas in it with that of the previous year. The result showed a reduction of 20 per cent. of revenue, which corresponded with the reduction of 10d. per 1000 cubic feet. Mr. Lorimer thought the proposal was premature. They should, he thought, have a little trial of things; and he moved that no increase of salary be given at present. Mr. Dundas, in seconding, said the gas he was getting was not so good as it used to be, whatever price they were paying for it. Mr. Young was a good man, and might deserve an increase of salary; but they should have time to consider the matter. Bailie Melvin considered that they were bound to pay their servants fair remuneration for the quality of the work they did. What was proposed was really no more than Mr. Young was entitled to. Mr. Robertson said they were all agreed in the Committee that Mr. Young had done his work splendidly. They were more than £1000 to the good. The increase was voted by 12 votes to 3.

Mr. H. Richardson, the Electrical Engineer to the Corporation of Dundee, on Thursday evening delivered a lecture to the Dundee Institute of Engineers on "The Use of Electricity for Lighting and Power Purposes." It was often said, he remarked, "that lighting by electricity was dearer than by gas. There were few towns, however, in the country where both illuminants were not on level terms; and as electricity got a larger proportion of the total lighting to do, gas would have all its work cut out for it to compete with electricity in price, let alone in other well-known advantages." A discussion followed the lecture, in which diverse views were expressed. These were of little consequence, being, as indeed were the lecturer's, unsupported by facts which can be tested. In a matter of this sort, opinions are of no value as compared with the results obtained in specific instances. There must be many of these available; and I have a suspicion that if it were possible to establish that electricity is cheaper than, or as cheap as, gas, our electric lighting friends are not so modest as to keep the information to themselves. We know their shouting on the housetops too well for any belief of that sort.

The Gas Committee of the Falkirk Corporation on Tuesday visited Glasgow for the purpose of seeing the Tradeston Gas-Works there. They had previously visited the Granton works of the Edinburgh and Leith Corporations, and they were desirous of seeing the gas stoking plant in use in Glasgow. It is reported in a Falkirk newspaper to-day that the Committee were satisfied that the method of carbonizing at Granton is far superior to that at Tradeston, although the plant at Granton is more expensive.

At the Denny Town Council on Monday, it was reported that, at the request of the Council, Mr. W. R. Herring, of Edinburgh, had examined the gas-works and reported on their condition. It was stated that Mr. Herring appeared to be satisfied with the works, but had made several suggestions. His report will be submitted in due course.

The Broughty Ferry Town Council on Monday considered a proposal to extend the electric installation of public lighting. The proposal was to erect eight arc lamps, which would displace 28 gas-lamps. The annual cost would be £43 more than lighting by gas. The Council, by nine votes to three, refused to adopt the scheme, and instructed the Inspector of Lighting to report upon the improved lighting of the district by gas. This is a very telling commentary upon the remarks of Mr. Richardson, given above, with reference to the relative costs of gas and electricity.

The Dunblane Town Council have resolved to appoint an engineer to value the undertaking of the Dunblane Gas Company, Limited. The intention is evidently to prepare the way for a transfer.

The action which was instituted in the Court of Session by Thos. Chapman, of Commonhead, Airdrie, and others, against the Coatbridge Gas Company (see "JOURNAL," Vol. LXXXIV., p. 360), with reference to the supply of gas by the Coatbridge Gas Company within the burgh of Airdrie, has been withdrawn. The question in dispute will be settled by the Parliamentary Commission which is to consider the two applications for Provisional Orders to regulate the gas supply of Airdrie which have been deposited on behalf of the Airdrie Gaslight Company and the Corporation of Airdrie. The inquiry is to take place in April. Petitions against both the measures have been lodged—against the

PLEASE APPLY FOR PARTICULARS
OF
LITTLE'S
LATEST PATENT
TO
INCLINED RETORTS
WITH
ONE STAGE
TO SUIT RETORT-HOUSES BUILT FOR HORIZONTAL SETTINGS.
NEW
CONVEYOR COMPANY,
LIMITED
SMETHWICK.

Company's application by the Corporation, the County Council, and the Coatbridge Gas Company; and against that of the Corporation by the Airdrie and Coatbridge Gas Companies and the Council.

At the last meeting of the Annan Town Council, a Committee reported that they had considered a letter from the Secretary of the Annan Gas Company stating that the Company denied liability for a claim for damages by a ratepayer, and explaining the position of the Company in the matter of the opening up of streets. Treasurer Thomson moved that the Town Clerk be instructed to prepare regulations as to the opening up of the streets by the Gas Company in future, and that it be an essential of those regulations that liability should attach to the Company in respect of their work in opening up the streets for a period of twelve months, and that the Company be required to apply for permission before opening up the streets. The Council agreed to this proposal.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Jan.* 16.

Sulphate of Ammonia.

The week opened with a brisk market and somewhat higher prices, but although the quotations at the close are £12 15s. per ton f.o.b. Hull and £12 17s. 6d. to £13 per ton f.o.b. Liverpool and Leith, buyers are not quite so keen, urgent requirements being for the most part covered. For delivery up to June makers' ideas are about £13 per ton, but this price has not been reported paid. Further business has, however, been done for July-December at £12 11s. 3d. per ton f.o.b. Leith, and for October-March at £12 10s. per ton.

Nitrate of Soda.

This is firm, at 9s. 9d. per cwt. for ordinary quality, prompt or spring delivery. For refined quality, 3d. to 4½d. per cwt. premium is required.

LONDON, *Jan.* 16.

Tar Products.

The markets are very quiet all round, and there is very little business being done. Pitch is decidedly weak, although there is a fairly good inquiry for forward delivery; but the prices quoted here by dealers are so very low that they simply have the effect of preventing consumers purchasing. It is very difficult indeed to fix the actual value in England, as makers ask considerably higher prices than dealers or consumers are willing to pay. Benzol is in about the same position; but 90 per cent. is not quite so firm. Business is reported at 10⅜d. for prompt delivery; but, as a rule, makers ask 11d. in any position, while buyers will not offer more than 10½d. In 50-90 per cent., the position remains unchanged; and aniline makers are not at all anxious to purchase. There is really no business doing in toluol and solvent; and prices have not altered during the week. Creosote is still very firm; and prices are well maintained both in London and the North. A fairly good business has been done in crude carbolic acid at 1s. 6d. to 1s. 6½d. for January-June; but consumers will not raise their limits, although crystals are certainly stronger. Several small parcels of anthracene have been sold at from 1⅝d. to 2d. per unit, according to quality, for early delivery, and there are some inquiries for forward; but makers as a rule do not care to contract under 2½d. per unit, which price consumers decline to pay at present. Light oils have been in fairly good demand; but it is rather difficult to fix the price, as in some instances the carbolic acid has not been extracted, which makes a considerable difference in the value.

The average values during the week were: Tar, 21s. to 26s. Pitch, London, 36s. 6d. to 37s. 6d.; east coast, 34s. to. 35s.; west coast, 33s. 6d. to 34s. Benzol, 90 per cent., 10½d. to 11d.; 50-90 per cent., 7⅞d. to 8d. Toluol, 7½d. to 8d. Crude naphtha, 3½d.; solvent naphtha, 9d. to 10d.; heavy naphtha, 10½d. to 11d. Creosote, London, 1⅜d. to 1⅝d.; North, 1⅜d. Heavy oils, 2¼d. to 2½d. Carbolic acid, 60 per cent., 1s. 6d. to 1s. 6½d. Refined naphthalene, £5 to £7. Salts, 23s. 6d. to 25s. 6d. Anthracene, "A" quality, 1⅝d. to 2d.; "B" quality, 1d. nominal. Light oils, 2¼d. to 3d.

Sulphate of Ammonia.

The market continues very strong, both for prompt and forward shipment; and prices are well maintained. Beckton would not accept less than £13 in any position, and do not appear at all anxious to sell any quantity even at this price; while the South Metropolitan Company are reported to be quoting £13 2s. 6d. for February shipment, but only for a very limited amount. In Hull, there are still buyers at £12 15s. for January; but as a rule makers ask £12 16s. 3d. to £12 17s. 6d., and do not care to sell forward. Sales are reported in Leith at £12 16s. 3d.—£12 17s. 6d. for January shipment; and there is a very good inquiry for February-June. It is stated that offers of £12 18s. 9d. have been declined by manufacturers for February-March. The market in Liverpool continues fairly steady, and business has been done at about £12 16s. 3d. for prompt and £12 17s. 6d. for February-March.

We have received from the Colliery Guardian Company, Limited, "The Colliery Manager's Pocket-Book, Almanac, and Diary" for the current year, which is the 35th of its publication. It is edited by Mr. R. A. S. Redmayne, M.Sc., &c. Professor of Mining in the University of Birmingham, who has brought together a quantity of information which managers of collieries will find it convenient to have at hand in connection with their daily memoranda and cash accounts. The tables and formulæ are specially valuable; and reference to them and to the contents generally is facilitated by an index.

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COAL TRADE REPORTS.

Lancashire Coal Trade.

There is still an absence of any pressure of requirements which is usually looked for at this time of the year; but, apart from this, trade is in a fairly satisfactory condition. Colliery owners, if they are not able to stiffen in their quotations, are not only able to maintain prices at late rates, but are renewing contracts for steam fuel over the ensuing twelve months on practically the basis of last year's prices, any concessions not exceeding 3d. per ton. For house-fire coals, a fairly good demand comes forward; and here and there collieries are filling up slightly out of stock to meet requirements. Generally, however, the present output is sufficient to meet demands, with prices steady at about 13s. 6d. up to 14s. 6d. and 15s. per ton at the pit for the best house-fire qualities, 11s. and 11s. 6d. up to 12s. 6d. for seconds, and about 9s. 6d. to 10s. 6d. for the commoner sorts. Requirements for ironmaking, steam, and general manufacturing purposes continue not more than moderate; and prices remain unchanged at from about 8s. up to 8s. 6d. and 8s. 9d. per ton at the pit, according to quality. For good qualities of engine fuel, a fairly active demand is the general report; and some collieries are rather short of supplies to meet present requirements. Inferior descriptions of slack are still fairly plentiful, owing to surplus supplies in other districts coming upon the market. They are not, however, being pushed at quite such low figures as recently. Best slack is firm at about 6s. 3d. to 6s. 6d. per ton at the pit, with some special sorts fetching 6s. 9d., medium slacks are 5s. to 5s. 6d., and common about 4s. 3d. up to 4s. 9d. The shipping demand is still fairly good; but there is a tendency to fall off with regard to further buying of any weight. Good Lancashire steam coal averages 9s. 6d. to 9s. 5d. per ton. delivered at the Mersey ports.

Northern Coal Trade.

There is a fair trade for this season of the year, and collieries are generally well employed, though one or two of the steam coal pits have not quite full work. In best Northumbrian steam coals the trade is quiet, and the price may be put at about 9s. 6d. per ton f.o.b. For second-class steams, with a large production, the price is about 8s. 3d., and for steam smalls 3s. 10d. In gas coals, the tendency is to ease, now that the main pressure of the season is rapidly passing. The prices quoted are from 8s. 3d. to 9s. per ton f.o.b., according to the quality; the best kinds are the scarcer. Contracts are being made for export; and about 6d. per ton less than those of the past season is the current quotation for such. One of the large Scandinavian contracts is about to be settled in a few days. Gas coke is generally steady, The large output of this period seems to be well taken up, and the price to be maintained—about 14s. to 14s. 6d. per ton being the f.o b. price in the Tyne for good descriptions.

Scotch Coal Trade.

Work at the collieries has now been resumed; but trade is featureless. The prices qnoted are: Main 7s. 6d. to 7s. 9d. per ton f.o.b. Glasgow, ell 8s. 6d. to 9s. 6d., and splint 9s. 3d. to 9s. 6d. The shipments for the week amounted to 109,786 tons—a decrease of 52,530 tons upon the previous week, and of 11,682 tons upon the corresponding week of last year.

Reduction in Price at Crewe.—The London and North-Western Railway, who are the owners of the Crewe Gas-Works, intimate that they have decided to reduce the price of gas used for domestic purposes from 3s. to 2s. 8d. per 1000 cubic feet, and of that employed for motive power from 2s. 9d. to 2s. 5d.

Explosion at the Oldham Gas-Works.—On Monday evening of last week, there was an explosion at the Hollinwood Gas-Works of the Oldham Corporation. Gas appears to have escaped into a sewer running beneath the works; and, becoming ignited, the flame forced its way along the drain, lifting up the manholes, and bursting out to a great height. Happily, no personal injury was sustained.

Gas Consumers' Complaints at Weston-super-Mare.—As the result of a letter forwarded by the Weston-super-Mare Urban District Council to the Gas Company, suggesting the laying of larger mains throughout the older portion of the town as a means of remedying complaints received as to the defectiveness of the gas supply, a deputation, consisting of the Chairman (Mr. H. T. Price) and Manager (Mr. J. H. Gray) of the Company, recently waited on the Council and explained that 99 per cent. of the complaints made arose, not from defective mains or pressure, but from the insufficient diameter of the house connections. They said that if the Council would bring to their notice one of the worst cases forming the subject of complaint, they would supply new connections from the main to the house in proof of the correctness of their explanation as to the cause of the trouble. The matter was referred to the Lighting Committee.

Jubilee of the Gas Supply of Rome.—The "Pall Mall Gazette" recalls the interesting fact that Rome has now possessed a gas supply for fifty years; but at the same time it is pointed out that, even in 1854, gas was not wholly unknown in the city. Eight years earlier, Prince di Canino Bonaparte had seen it abroad, and he undertook to introduce it into his palace. This he did, putting down a private plant, and fitting up burners in all the rooms. But he was not long allowed to enjoy the fruits of his enterprise. According to our contemporary, "the neighbours rose to a man, protesting that the odour was unbearable; that they not only could not, but would not, endure it; and that they were afraid of their lives from explosion and suffocation. And this was not all; there was rebellion within also, as the Princess Zenaïdé Bonaparte was as indignant as all the others, and threatened to decamp to Paris. The Papal Government took up the matter; and the Prince, much against his will, had to give up his private gasometer." This opposition, however, did not prevent the introduction of a public gas supply; though the illumination of the principal streets by this means was made the subject of derision on the part of an ungrateful crowd.

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St. Helens Gas and Water Supply.—The year-book of the St. Helens Corporation just issued by the Town Clerk (Mr. W. H. Andrew) shows that during the past 18 years the annual make of gas has risen from 148,696,000 to 376,448,600 cubic feet; while the water supply has increased from 771 million gallons to 1352 millions.

Rickmansworth Gas Arbitration.—Mr. James Hepworth has been appointed Arbitrator for the Rickmansworth Gas Company in the forthcoming proceedings to determine the price to be paid by the Council for the compulsory acquisition of the undertaking. Mr. H. F. Jones will act in a similar capacity on behalf of the Council.

Charge for Delivering Coke at Rochdale.—Up to the present time, the Rochdale Gas Committee have made a uniform charge for coke, to whatever part of the town it had to be delivered; but now the borough has become so extensive, they have decided to make charges for delivery ranging from 3d. for 3 miles, down to 1½d. for the shortest distance.

Manchester Gas Workers and their Wages.—The Gas Committee of the Manchester Corporation on Friday had under consideration a letter from Mr. Clynes, the District Secretary of the Gas Workers' Union, who asked for an advance of wages for certain of the men employed at the gas-works. Some members of the Committee expressed the opinion that the men were as well paid as any of their class in the country; and as they had not approached the Committee themselves, nothing was done in the matter.

Improved Public Lighting for Sandwich.—The Sandwich Town Council have approved of a scheme for the re-organization and improvement of the public lighting. When Mr. T. E. Pye took over the management of the gas-works, he found that the lamps were not in first-rate condition; and he therefore determined to take the matter in hand. The Gas Committee fell in with his proposals—indeed, they went even further; and the result is the present scheme. This provides for the fitting of incandescent burners to the existing lamps in all the main streets of the town, and in other selected positions, the erection of nine additional lamps with incandescent burners, and the putting up of three or four 300-candle power lamps.

Opposition to the Bognor Gas Order.—A meeting of the parishioners of Barnham and Eastergate was held on Monday last week, to consider an application by the Bognor Gas Company for a Provisional Order extending their limits of supply so as to include the two parishes named. In the absence of Mr. W. A. Hounsom, J.P., the subject was introduced by Mr. H. R. Marshall, who moved a resolution consenting to the Order on certain conditions as to the price to be charged for the gas and the period in which the supply should be provided. To this an amendment was proposed that the Board of Trade be approached with a view to extending the time in which objections could be made, so that alternative schemes might be fully considered. This was carried by 14 votes to 6; and, without any further discussion, another motion was carried to the effect that the meeting declined to agree to the proposals of the Company, "in view of the possibility of the district providing their own lighting."

The Rawmarsh Urban District Council have let to Messrs. Robert Dempster and Sons, Limited, of Elland, the contract for converting some of their existing settings into Waddell's patent regenerators.

Messrs. Biggs, Wall, and Co. have secured a contract for a 10-ton sulphate plant from the Great Southern and Western Railway of Ireland; and also a further order from the Weston-super-Mare Gas Company for their charging-machine.

The Loomis-Pettibone Gas Machinery Company have amalgamated with the Holthoff Machinery Company, of Milwaukee, and the united businesses are now being carried on as the Power and Mining Machinery Company, at 52 & 54, William Street, New York.

The Water Committee of the Manchester Corporation have received from their Engineer (Mr. G. H. Hill, M.Inst.C.E.) and from the City Surveyor (Mr. T. de Courcy Meade, M Inst.C.E.) estimates of the probable sum that will be required to pay for the new works to be carried out in the present year, including the Thirlmere pipe laying. The expenditure is put down at £1,294,700.

Last Thursday, the Finance Committee of the Aberavon Corporation were engaged in cutting down the salaries of officials; that of the Gas Manager (Mr. A. Bond) being among them. Mr. Bond has received 50s. a week, with house, coal, and gas free. It was proposed that he be paid 40s., with free house, and pay for coal and gas; and this was carried in preference to an amendment simply reducing the salary by 10s. per week.

Messrs. Willey and Company, Limited, of Exeter, are meeting with excellent success with their patent purifier valves—Pickering's disc valves and Grove and Pickering's hydraulic valves. With both types, connections are entirely dispensed with. In a small booklet which the firm have issued illustrating the various forms of the valves, it is seen that they have been applied in several gas-works, and that the engineers have expressed unqualified satisfaction with them.

Tenders for £100,000 of debenture stock "C" and £200,000 of debenture stock "D" of the New River Company, which were invited in our advertisement columns on the 29th ult., were opened on Thursday, and amounted to £462,600. Tenders for "C" stock at £86 10s. 6d. will receive 67 per cent. of the amount applied for; above this, allotments will be made in full. Tenders for "D" stock at £86 10s. 6d. will receive 90 per cent. of the amount applied for; those for higher sums than this, allotments in full.

The Chemical Engineering Company and Wilton's Patent Furnace Company are sending out a new catalogue relative to their patent furnaces, which are now in use in a large number of gas-works at home and abroad. These furnaces utilize coke breeze and pan breeze, and their special features are that there are no fire-bars or ash-pit. The catalogue illustrates the application of these furnaces to Lancashire boilers and oil and tar stills; and the Company will be pleased to supply copies of it (in English, French, German, or Italian) in response to an application addressed to their offices, 79, Mark Lane, E.C.

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MAIN COCKS

(OF EVERY DESCRIPTION),

SYPHON AND LUBRICATOR PUMPS

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LONDON and EXETER.

Quotations cheerfully given for all kinds of Gas Fittings.

In the Chancery Division of the High Court of Justice last Tuesday, Mr. Justice Byrne made an order for the reduction of the capital of the Thomas Lighting Company, Limited, by writing off £10,000, which sum is not now represented by available assets, owing to the depreciation in the value of the Company's patents which related to the lighting of railway carriages. His Lordship also sanctioned the restoration to the Register of Joint-Stock Companies of the name of the Amersham Gaslight and Coke Company, Limited, on an undertaking being given to file certain returns which, by inadvertence, the Company had neglected to forward to the Registrar.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

ENGINEER AND MANAGER. Southport Gas Department. Jan. 25.
DRAUGHTSMAN. Jenkins and Co., Retford.
WORKING MANAGER. Whitchurch Gas Company, London Office.
WORKING MANAGER. Stane and Dykehead Gas Company. Feb. 3.
CHARGE OF METER, STOVE, AND FITTING DEPARTMENT. No. 4 48.
MAIN AND SERVICE LAYER. Merthyr Tydfil Gas-Works.

Situation Wanted.

WORKING MANAGER. No. 4'52.

Plant, &c., for Sale.

CONDENSER (250,000 feet). Redditch Gas-Works.
STATION METERS. Gaslight and Coke Company. Tenders by Jan. 28.
GAS METERS. Llandudno Gas Department. Tenders by Feb. 1.

Plant (Second Hand) Wanted.

PURIFIERS. North Ormesby Gas-Works.

Company Meeting.

SOUTH METROPOLITAN GAS COMPANY. Cannon Street Hotel, Feb. 10. Two o'clock.

Sales of Stocks and Shares.

SHREWSBURY GASLIGHT COMPANY. Jan. 27.
SOUTH ESSEX WATER COMPANY. Feb. 2.

TENDERS FOR

Bricks (Various).

EDINBURGH AND LEITH GAS DEPARTMENT. Tenders by Jan. 25.

Charging Machine.

ABERGAVENNY GAS DEPARTMENT. Tenders by Feb. 4.

Coal-Handling Plant.

SALFORD GAS DEPARTMENT. Tenders by Feb. 4.

Gasholder (Re-sheeting).

HOLYWOOD GAS COMPANY, CO. DOWN.

Oxide of Iron (Spent).

HAGUE GAS-WORKS.

Purifiers.

NORTH ORMESBY GAS-WORKS.

Regenerative Furnaces (Complete).

KEIGHLEY GAS DEPARTMENT. Tenders by Feb. 1.

Retort Installation.

ABERGAVENNY GAS DEPARTMENT. Tenders by Feb. 4.

Stoking Machinery.

SALFORD GAS DEPARTMENT. Tenders by Feb. 4.

Washer-Scrubber.

ABERGAVENNY GAS DEPARTMENT. Tenders by Feb. 4.

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No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

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Subscribers who desire to avail themselves of the reduction in the Subscription by paying in advance for the Year 1904, are reminded that this can only be done during the current month.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 139.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 15	10½	Alliance & Dublin 10 p.c.	18½—19½	..	5 7 8
100,000	10	,,	7½	Do. 7 p.c.	12½—13½	..	5 11 1
200,000	5	Nov. 12	6½	Bombay, Ltd. . . .	5½—6	..	5 8 4
140,000	5	,,	6½	Do. New, £4 paid	4—4½	..	5 15 7
380,000	Stk.	Aug. 13	12	Brentford Consolidated	22⅝—33	..	5 3 0
300,000	,,	,,	9	Do. New	171—176	..	5 2 3
50,000	,,	,,	5	Do. 5 p.c. Pref. .	130—135	..	3 14 1
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb. .	103—108	..	3 14 1
220,000	Stk.	Sept. 11	10½	Brighton & Hove Orig.	207—212	..	5 1 5
246,320	,,	,,	7½	Do. A. Ord. Stk. .	141—150	..	5 3 4
460,000	20	Oct. 15	10	British.	38½—39½	..	5 1 3
100,000	Stk.	Aug. 13	6	Bromley, Ord, 5 p.c. .	115—120	..	5 0 0
165,700	,,	,,	4½	Do. do. 3½ p.c. .	88—93	..	4 16 9
500,000	10	Oct. 15	7	Buenos Ayres (New) Ltd	1 ⅛—11	+¼	6 7 3
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	91—93	..	4 6 0
150,000	20	July 10	8½	Cagliari, Ltd. . . .	22—24	..	6 17 6
100,000	10	June 11	10	Cape Town & Dis., Ltd.	11—15	..	6 13 4
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
1,375,000	Stk.	Aug. 27	5 5/16	Commercial 4 p.c. Stk.	104—107	..	4 17 3
503,750	,,	,,	5	Do. 3½ p.c. do.	98—101	⅛	4 19 0
442,947	,,	Dec. 11	3	Do. 3 p.c. Deb. do.	84—87	..	3 9 0
800,000	Stk.	Dec. 30	7	Continental Union, Ltd.	115—120	..	5 16 8
200,000	,,	,,	7	Do. 7 p.c. Pref.	128—133	..	5 5 3
575,000	Stk.	Aug. 27	5½	Crystal Palace Ord. 5 p.c.	110—115	..	4 12 9
60,000	,,	,,	5	Do. 5 p.c. Pref. .	118—123	..	4 1 4
112,533	,,	Jan. 14	5	Do. 5 p.c. Deb. Stk.	134—137*	+1½	3 13 10
486,090	10	July 29	10½	European, Ltd. . . .	18½—19½	..	5 7 8
354,060	10	,,	10½	Do. £7 10s. paid	13—14	..	5 12 6
15,243,200	Stk.	Aug. 13	4 5/16	Gaslight and Coke Ord. . .	87—89	..	4 18 10
2,600,000	,,	,,	3½	Gaslight and Coke 3½ p.c. max.	87—89	..	3 18 8
3,799,735	,,	,,	4	Gaslight and Coke 4 p.c. Con. Pref.	107—110	..	3 12 9
4,193,975	,,	Dec. 11	3	Coke and Gaslight 3 p.c. Con. Deb.	85—87	..	3 9 0
258,740	Stk.	Sept. 11	5	Hastings & St. L. 3½ p.c.	90—95	..	5 5 3
70,000	10	Oct. 15	11	Hongkong & China, Ltd.	16—17	..	6 9 5
3,800,000	Stk.	Nov. 12	10	Imperial Continental .	197—201	..	5 0 0
473,600	Stk.	Aug 13	3½	Do. 3½ p.c. Deb. Red.	98—100	..	3 10 0
165,242	Stk.	Aug. 27	6	Lea Bridge Ord. 5 p.c.	113—118	..	5 1 8
561,000	Stk.	,,	10	Liverpool United A .	214—216	..	4 12 7
718,100	,,	,,	7	Do. do. B .	162—164	..	4 5 4
306,083	,,	Dec. 30	4	Do. do. Deb. Stk.	108—110	..	3 12 9
75,000	5	Dec. 11	5	Malta & Medn., Ltd. .	4¼—4¾	..	5 5 3
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	101—105	..	4 15 3
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	Nov. 12	3½	Monte Video, Ltd. . .	9—10	..	7 0 0
1,515,892	Stk.	Aug. 13	4½	Newc'tle & G'tesh'd Con.	105—107	..	4 4 1
376,855	Stk.	Dec. 31	3½	Do. 3½ p.c. Deb.	94—95	..	3 13 8
300,000	Stk.	Nov. 26	8	Oriental, Ltd. . . .	135—140	..	5 14 4
600,000	5	Sept. 30	7	Ottoman, Ltd. . . .	5—6	..	5 16 8

* Ex div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
205,005	Stk.	Jan. 14	6½	Ply'mth & St'house 5 p.c	121—126*	+1	4 17 2
851,070	10	Oct. 15	7	River Plate Ord. . .	11—11⅛	..	6 1 9
300,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb..	92—94	..	4 5 1
250,000	10	Sept. 30	8	San Paulo, Ltd.. . .	10½—11½	..	6 19 2
135,000	Stk.	Sept. 11	10	Sheffield A	240—242	..	4 2 8
209,984	,,	,,	10	Do. B	240—242	..	4 2 8
523,498	,,	,,	10	Do. C	239—241	..	4 3 0
116,106	Stk.	Sept. 30	5	Shrewsbury Ord. 5 p.c.	109—112	..	4 9 3
6,150,000	Stk.	Aug. 13	5½	South Met., 4 p.c. Ord.	117—120	..	4 8 10
1,780,000	,,	Jan. 14	3	Do. 3 p.c. Deb. . .	84—87*	−½	3 9 0
380,940	Stk.	Nov. 12	5	Southampton Ord. . .	105—110	..	4 10 11
87,950	,,	Jan. 14	4	Do. 4 p.c. Deb.	100—103*	..	3 17 8
120,000	Stk.	Aug 27	6	Tottenham and Edmonton A. 5 p.c.	115—120	..	5 0 0
313,020	,,	,,	4½	Tottenham and Edmonton B. 3½ p.c.	95—100	..	4 10 0
182,380	10	Dec. 30	8	Tuscan, Ltd.	8—9	..	8 17 10
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	57—59	..	5 1 0
737,142	Stk.	Aug. 13	5	West Ham, 5 p.c. Ord.	56 59	+2	5 1 0
				WATER COMPANIES.			
781 517	Stk.	Dec. 30	12	Chelsea, Ord. . . .	310—315	+2½	3 16 2
150,000	,,	,,	5	Do. 5 p.c. Pref .	140—145	..	3 9 0
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	130—135	..	3 6 8
175,785	,,	Sept. 30	4½	Do. 4½ p.c. Deb. .	132—137	..	3 5 8
1,720,560	Stk.	Oct. 15	8	East London, Ord.. .	213—223	+2	3 11 9
654,740	,,	Dec. 11	4½	Do. 4½ p.c. Deb. .	133—138	..	3 5 3
1,282,943	,,	,,	3	Do. 3 p.c. Deb. .	87—90	..	3 6 8
700,000	50	Dec. 11	10	Grand Junction 10 p.c. max..	134—137	+1	3 13 0
310,000	Stk.	Sept. 30	4	Grand Junction 4 p.c. Deb..	115—120	..	3 6 8
708,000	Stk.	Aug. 13	10	Kent	290—300	..	3 6 8
160,000	,,	,,	7	Do. New, 7 p.c. max..	105—205	..	3 8 4
1,043,800	100	Dec. 30	11	Lambeth, 10 p.c. max..	285—295	..	3 14 7
406,200	100	,,	8½	Do. 7½ p.c. max..	215—225	+5	3 15 7
350,000	Stk.	Sept. 30	4	Do. 4 p.c. Deb..	115—120	..	3 6 8
500,000	100	Aug. 13	12 5/16	New River, New Shares	305—315	..	4 1 3
1,000,000	Stk.	July 29	4	Do. 4 p.c. Deb..	115—120	..	3 6 8
902,300	Stk.	Dec. 30	7½	Southwark Ord. . . .	243—248	+10	3 0 6
126,500	100	,,	7½	Southwark and Vauxhall 7½ p.c. max.	200—210	+5	3 11 5
489,200	Stk.	,,	5	Southwark and Vauxhall 5 p.c. Pref..	140—145	+2	3 9 0
1,019,585	,,	Oct. 15	4	Vauxhall 4 p.c. A Deb.	115—120	..	3 6 8
1,155,066	Stk.	Dec. 11	10	West Middlesex. . .	290—295	..	3 7 9
200,000	,,	,,	4½	Do. 4½ p.c. Deb. .	130—135	..	3 6 8
200,000	,,	Sept. 11	3	Do. 3 p.c. Deb. .	88—91	..	3 5 11

* Ex div.

OXIDE OF IRON.

O'NEILL'S OXIDE has a larger annual sale than all other Oxides combined.

SPENT OXIDE purchased in any district.

GAS PURIFICATION & CHEMICAL CO., LD.

JOHN WM. O'NEILL, Managing Director,

PALMERSTON HOUSE, LONDON, E.C.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for GAS-WORKS.

ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London E.C. "Volcanism, London."

BROTHERTON & CO., LIMITED.

Offices: Commercial Buildings, LEEDS.

Correspondence invited.

SULPHATE OF AMMONIA SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.

For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."

Largest Practice and most Up-to-Date Works in Britain.

JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.

BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

"NUGEPE" CEMENT.

JOHN E. WILLIAMS AND CO.,

VICTORIA PAINT WORKS, MANCHESTER.

For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PATENTS AND TRADE MARKS PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.

MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

GAS TAR wanted.

BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PENNY-IN-THE-SLOT WORK.

H. GREENE & SONS, Ltd., are pre- pared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.

SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.

Telephone: 1693 HOP. Telegrams: "LUMINOSITY."

AMMONIACAL Liquor wanted by JOHN RILEY & SONS, Hapton, near ACCRINGTON.

WANTED, a Situation as Working MANAGER by Practical Experienced Man. Married. Age 34. Thoroughly acquainted with the routine of Gas-Works Duties.

Address No. 4152, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

BOROUGH OF SOUTHPORT.

APPOINTMENT OF GAS ENGINEER AND MANAGER.

THE Gas Committee are prepared to receive APPLICATIONS for the position of GAS ENGINEER and MANAGER of their Works and Undertaking at Southport.

Applicants, who must either have been Managers or Deputy-Managers of large modern and successful Gas Undertakings, must state in their Applications their Age, full detailed Particulars of their Mechanical, Practical, and Scientific Training, and the Salary they are prepared to accept.

The minimum value of the office will not be less than £500 per annum. The Committee are prepared to pay a Salary in accordance with the experience and ability of the person appointed.

Details as to Gas Manager's Residence and further Particulars may be obtained on application to the undersigned.

Canvassing by a candidate, or by anyone on his behalf, will be a disqualification.

Applications, accompanied by *copies* (which will not be returned) of from two to five Testimonials as to the candidate's professional ability must be forwarded to my office, endorsed "Gas Engineer," on or before Monday, the 25th inst.

By order,
J. ERNEST JARRATT,
Town Clerk.

Town Hall, Southport,
Jan. 6, 1904.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

DUTCH OXIDE OF IRON.

THE First Dutch Bog Ore Co., Ltd., (Eerste Hollandsche Yzererts Maaty), ROTTERDAM.

General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.

London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.

General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

SULPHURIC ACID.

SPECIALLY prepared for the Manu- facture of SULPHATE OF AMMONIA.

SPENCER, CHAPMAN, AND MESSEL, LIMITED, 36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.

Telegrams: "HYDROCHLORIC, LONDON."

Telephone: 341 AVENUE.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

DRAUGHTSMEN.

GOOD Draughtsmen wanted. Used to Coal and Coke Handling Plants, and Gas-Works Plant in general.

Apply, stating Salary and Experience, to W. J. JENKINS AND CO., LTD., RETFORD.

STANE AND DYKEHEAD GAS COMPANY, LIMITED.

WANTED, a Working Manager for the Works of the above Company at Shotts. Probable make of Gas, 3 Million cubic feet.

Applications, stating Qualifications and Salary, to be lodged, not later than the 3rd of February next, with the Secretary, THOMAS RAE, Solicitor, WISHAW.

WANTED, at the end of March, for the Whitchurch Gas-Works, Hampshire, making 8 to 10 Millions, a competent WORKING MANAGER. Must have had good Experience in Carbonization, Main Laying, and Fitting.

Applications, in own Handwriting, stating Age, Qualifications, and Salary required, to be addressed to the SECRETARY of the Company, 13, High Street, DEPTFORD, S.E.

WANTED, by the Merthyr Tydfil Gas Company, a steady reliable MAIN and SERVICE LAYER. Constant employment to a suitable man. Wages 28s. per week.

Applications and Testimonials to the undersigned.
JAMES E. KENSHOLE,
General Manager.

Gas Offices, Merthyr Tydfil,
Glamorganshire, Jan. 12, 1904.

WANTED, for a Large Provincial Gas- Works, a competent Man to TAKE CHARGE of the Meter, Stove, and Gas-Fitting Departments.

Applicants must have had good Experience in Repairs of Meters and Stoves, and in pushing the Sale and Hire of Stoves and Fires.

A knowledge of Maintenance of Burners, &c., for Incandescent Lighting will be a recommendation.

Apply by letter (without Testimonials), stating Experience, Salary required, &c., to No. 4148, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Set of four Purifiers, new or Second-Hand, each about 14 ft. by 14 ft. by 5 feet deep, lutes or luteless, with 15-inch dry Centre Valve and Connections.

Prices, erected on the Works complete, addressed to T. WEATHERLY, Secretary, Gas-Works, North Ormesby, near MIDDLESBROUGH.

CONDENSER for Sale. In splendid Condition. Cheap. Capacity 250,000 Cubic Feet per Twenty-four hours.

Apply to A. E. LAYTON, Manager, Gas-Works, REDDITCH.

SPENT OXIDE OF IRON.

FOR SALE—500 Tons of Spent Oxide of IRON, containing about 50 per cent. of Sulphur.

Delivery before May, 1904, f.o.b. Rotterdam or Amsterdam.

Tenders invited by the Manager, and are to be addressed to the DIRECTION OF THE MUNICIPAL GAS-WORKS, The Hague, HOLLAND.

OXIDE OF IRON.

(NATURAL.)

BALE & CHURCH will be pleased to send Samples and Quotations, and make Offers for SPENT OXIDE.

BALE'S FIRE CEMENT, PAINT, AND GAS COAL,

5, CROOKED LANE, LONDON, E.C.

COAL GAS TAR wanted.

Gas Managers in Gloucester, Somerset, Worcester, Devon, Wilts, Hereford, Monmouth, and Glamorgan PLEASE NOTE. BEST PRICE offered either on Fixed or Sliding-Scale Basis.

State Quantity to offer for Prompt and Forward Delivery.

The SHARPNESS CHEMICAL COMPANY, Tar Distillers, Sharpness Docks, GLOS.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.

READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

TO BE SOLD—Twin-Cylinder Gas- ENGINE, 6 n.h.p., by Crossley; Cylinders 8 in. diameter by 18 in. stroke, and Gas-Bag.

NEW GASHOLDER SHELLS, 40 feet diameter by 12 feet deep, and 50 feet diameter by 15 feet deep, with or without New Steel Tanks and Standard Guides.

Write J. WRIGHT, 181, Queen Victoria Street, LONDON, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

STATION METERS.

THE Directors of the Gaslight and Coke Company are prepared to receive, on or before Thursday, the 28th inst., sealed TENDERS for the purchase from the Company's Works at Laburnam Street, Kingsland Road, London, N.E., of Three disused STATION METERS—viz.,

One, erected in 1873, by the Gas-Meter Company, Ltd. Capacity about 160,000 cubic feet per hour.
Two, erected in 1864, by W. Parkinson and Co. Capacity about 40,000 cubic feet per hour each.

The Station Meters may be inspected at the Works upon application to the Resident Engineer, Mr. H. V. Pearson.

Conditions and Forms of Tender to be obtained on application to the undersigned.

By order,
HENRY RAYNER,
Secretary.

Chief Office: Horseferry Road,
Westminster, S.W., Jan. 16, 1904.

COUNTY BOROUGH OF SALFORD.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply and erection of RETORT STOKING MACHINERY and COAL-HANDLING PLANT required at their Liverpool Street Works.

The Drawings may be seen, and copies of the Specification and Form of Tender obtained (for which a charge of £1 1s. will be made, to be returned on receipt of a *bonâ-fide* Tender), on application to Mr. Wm. W. Woodward, Engineer, Gas Offices, Bloom Street, Salford.

Sealed Tenders, endorsed "Tenders for Retort-Stoking Machinery, &c.," addressed to the Chairman of the Gas Committee, Town Hall, Salford, to be delivered to me not later than Three p.m. on Thursday, the 4th of February, 1904.

L. C. EVANS,
Town Clerk.

Town Hall, Salford, Jan. 15, 1904.

ABERGAVENNY GAS-WORKS.

THE Gas Committee of the Abergavenny Town Council invite separately TENDERS as follows:—

1.—For an Installation of Drake's pattern deep REGENERATIVE RETORTS of Six Arches, to be constructed and set to work at Abergavenny Gas-Works.
2.—For a Holmes pattern WASHER-SCRUBBER, capable of dealing with 500,000 cubic feet of Gas per day, to be erected and set to work at the Abergavenny Gas-Works.
3.—For a MANUAL CHARGING-MACHINE (limited to Biggs, Wall, and Co.'s "Rapid") to be erected and set to work on a Retort-Bench of Six Arches, at the Abergavenny Gas-Works.

Drawings and Specifications of any of the above may be seen, and any other Information may be obtained, on application to Mr. Hubert Russell, M.E., at his Office, Gas-Works, Abergavenny.

Sealed Tenders, endorsed "Tender for ———," to be delivered to the Town Clerk, Town Hall, Abergavenny, not later than Thursday, Feb. 4, 1904.

The lowest or any Tender not necessarily accepted.

J. T. RUTHERFORD,
Town Clerk.

Town Hall, Abergavenny,
Jan. 16, 1904.

TAR Contracts Wanted on the Sliding-Scale or at Fixed Prices.

Managers and Secretaries desirous of selling to best advantage please communicate with DENT AND CO., Ouse Chemical Works, SELBY.

THE Holywood Gas Company Limited, Co. Down, invite TENDERS for RESHEETING a small Gasholder, 40 ft. 2 in. by 12 ft. 6 in deep; and also repairing any Stays or other Ironwork which may be found defective.

T. FRIZELLE,
Manager.

THE Llandudno Urban District Council are prepared to receive TENDERS for a quantity of Second-Hand 3 and 5 Light Dry GAS-METERS, to be sold at a sacrifice, all of which have been tested and are in good repair.

Offers for quantities of Meters required, packed free on rail at Llandudno Station, are to be sent in to the undersigned on or before Monday, the 1st day of February, 1904.

ALFRED CONOLLY,
Clerk to the Council.

Town Hall, Llandudno,
Jan. 12, 1904.

TO BRICKLAYERS AND IRONFOUNDERS.

THE Gas Committee of the Keighley Corporation are prepared to receive TENDERS for the Works and Plant required in the erection of a Stack of Four through Settings of REGENERATIVE FURNACES complete.

Drawings and Specifications, &c., can be seen at the Gas Offices, Cook Lane, Keighley, where Form of Tender can be obtained.

Tenders, sealed and addressed to the Chairman of the Gas Committee, and endorsed "Tender for New Stack," to be sent to the undersigned not later than Monday, the 1st of February next.

By order.
JOHN LAYCOCK,
Engineer.

Keighley, Jan. 15, 1904.

SHREWSBURY GAS LIGHT COMPANY.

DESIRABLE INVESTMENT.

THE Directors of the above Company invite TENDERS for

£10,000 SHREWSBURY GAS CONVERTED ORDINARY STOCK

Minimum Price of Issue, £110 per £100 Stock.

This Stock is entitled to a Standard Dividend of 5 per cent., payable half yearly; and the Maximum Dividend has been paid for many Years.

January 27, 1904, is the last day for the reception of Tenders.

Forms of Tender may be had on application to LLOYDS BANK, LIMITED, SHREWSBURY, or to the Company's SECRETARY, from whom any further Information can be obtained.

By order of the Directors,
WM. BELTON,
Secretary.

Gas-Works, Shrewsbury,
Dec. 17, 1903.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

TO BRICK AND TERRA-COTTA MANUFACTURERS.

THE Commissioners are prepared to receive TENDERS for the supply of Ordinary and Special Composition Terra-Cotta, Enamelled, and Glazed BRICKS, delivered in Railway Waggons at their Sidings, Gas-Works, Granton, near Edinburgh (Caledonian or North British Railway Systems), or free on rail alongside Quay, Granton Harbour.

Deliveries to commence about the end of March, 1904, and to continue for a period of about Two Years. There will be about 2 Million Composition Bricks and 300,000 Red Terra-Cotta Facing Bricks, in addition to Arch Bricks, Bull Nose, Splays, &c.

Full Particulars and Schedules of Quantities and Forms of Tender can be obtained upon application to Mr. W. R. Herring, M.Inst.C.E., Chief Engineer and Manager, New Street Works, Edinburgh.

Tenders to be lodged with the undersigned on or before Monday, the 25th day of January, 1904, at Ten a.m., sealed and endorsed "Tender for Composition and Terra-Cotta Bricks, &c."

The Commissioners do not bind themselves to accept the lowest or any Offer, and reserve to themselves the right of accepting the whole or any portion of the materials tendered for, and, further, to nominate more than one party to supply their requirements in the nature of both Composition and Terra-Cotta Facing Bricks.

JAMES M'G. JACK,
Clerk.

25, Waterloo Place, Edinburgh,
Dec. 26, 1903.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

SOUTH METROPOLITAN GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Cannon Street Hotel, in the City of London, on Wednesday, the 10th day of February next, at Two o'clock in the afternoon precisely, to receive the Directors' Report and the Accounts of the Company for the Half Year ended the 31st of December last, to declare a Dividend for the same period, and to elect Two Directors and One Auditor in the place of those retiring by rotation.

The TRANSFER BOOKS WILL BE CLOSED from the 27th day of January until after the Meeting.

By order,
FRANK BUSH,
Secretary.

Offices: 709, Old Kent Road, S.E.,
Jan. 16, 1904.

EUROPEAN GAS COMPANY, LIMITED.

NOTICE is Hereby Given, that an In-terim Dividend of Four per cent. will be paid, free of Income-Tax, as usual, on the 1st of February next.

Holders of Share Warrants to Bearer may receive the above—viz., Eight Shillings per Share—on leaving Serial Coupon No. 58 for examination at the Union of London and Smith's Bank, Ltd., Prince's Street, London, three days previously.

And Notice is Hereby further Given, that the TRANSFER BOOKS WILL BE CLOSED from the 18th to the 30th inst., both days inclusive.

W. WILLIAMS,
Secretary and General Manager.

Jan. 12, 1904.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTH ESSEX WATER-WORKS COMPANY.

NEW ISSUE OF £5000 ORDINARY STOCK,
AND
£1000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Feb. 2, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

Price 15s., Limp Cloth,

ANALYSIS OF THE ACCOUNTS

OF THE

METROPOLITAN WATER COMPANIES

AND OF THE

CORPORATION WATER UNDERTAKINGS

OF

EDINBURGH, GLASGOW, & MANCHESTER.

FOR THE YEAR 1902-1903.

Compiled by

WOOD, DREW, & CO.,

Chartered Accountants.

WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

ALEXANDER CAMERON,

GAS AND CANNEL COAL MERCHANT,

48, WEST REGENT STREET,

GLASGOW.

THE PERFECT MANTLE COY.

1c, Aldgate Avenue, London, E.C.

MANUFACTURERS OF THE WELL-KNOWN

SUPERIOR "PERMCO"

MANTLE, IN COTTON AND RAMIE.

Under Welsbach Licence. Can be used legally with any Burner.

Trade Price 26s. 6d. per Gross.

Reduction for Quantities.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, NEAR DEWSBURY.

THE

PETROLEUM GAS SYNDICATE

Supply and erect Complete Installations of their

PETROGENE PATENT GAS PLANT

On SALE, HIRE, or ROYALTY.

PETROGENE GAS is the most suitable Illuminant for all Towns, Villages, Factories, Institutions, &c., where a Cheap and Efficient Lighting System is required. It is equally suitable for Heating and Power purposes, and may be used with ordinary Gas Fittings, Stoves, Engines, &c. It may also be used in conjunction with Coal Gas, and affords Gas Companies a ready means of increasing their output without the expense of additional storage.

The Syndicate is prepared to entertain offers of sale of small Gas-Works, whether profit earning or not.

Offices: **28, Victoria St., Westminster.**

Works: **10, Rochester Row, S.W.**

THE

"ROTARY"

STATION METER.

Efficiency Demonstrated.

APPLY—

T. G. MARSH,

MAWSON CHAMBERS, DEANSGATE,

MANCHESTER.

PODMORE & THOMAS'

PATENT

INTENSIFIED SYSTEM

BURNERS

DUST AND INSECT PROOF.

PATENT LAMPS for INTERIOR LIGHTING.

Suitable for

Foundries, Offices, Show-Rooms, Shop Lighting, &c.

Can also be made as Ventilating Lights for Public Halls and Private Rooms.

No. 6 B. 3-LIGHT.

Can be adjusted to suit any Quality of Gas.

The highest efficiency yet obtained from Low-Pressure Incandescent Gas Lighting without mechanical aid.

Our full Catalogue is now ready, illustrating various Designs of our Patent System up to any Power for Private and Public Lighting.

A. E. PODMORE & CO.,

25a, HATTON GARDEN, E.C.

Telephone No. 6600 CENTRAL.
Telegrams: "PROMEROPE, LONDON."

TROTTER, HAINES, & CORBETT, LIMITED,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

JOHN HALL & CO.,
STOURBRIDGE,
Manufacturers of
FIRE-BRICKS, LUMPS, TILES,
GAS RETORTS,
And every description of Fire-Clay Goods.

RETORTS CAREFULLY PACKED FOR SHIPMENT.

'BUFFALO' INJECTOR

Operated Entirely by One Handle
Class A lifts 24 ft.
Class B lifts 12 ft.
SEND FOR LIST.
Telegrams: "Temperature, London." Tel. No. 9060 London Wall.
GREEN & BOULDING, 105, Bunhill Row, LONDON, E.C.

WELDON MUD
FOR
GAS PURIFICATION,
For use in the
RECOVERY OF SULPHUR,
Also Removal of last Traces of
SULPHURETTED HYDROGEN
in catch position.

Full Particulars on application to the Patentees:
GAS DESULPHURIZATION CO.,
— LIMITED, —
1, FENCHURCH AVENUE, LONDON, E.C.

HEATHCOTE GAS COAL.
Rich in Illuminating Power and yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,
CHESTERFIELD.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

HENRY MILNES,
INGLEBY WORKS,
GIRLINGTON, BRADFORD.

MANUFACTURER OF
HIGH-CLASS LATHES
For Sliding, Surfacing, Screw-cutting, and Plain Turning.
Milling Machines, Planing Machines, Slide Rests, Chucks, &c.

Lathes and Tools of my make may be inspected by any intending purchaser at addresses given below.

Agent for Scotland:
THOS. HILL & Co., 66, Robertson Street, Glasgow.
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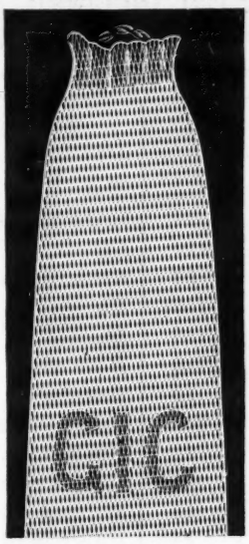

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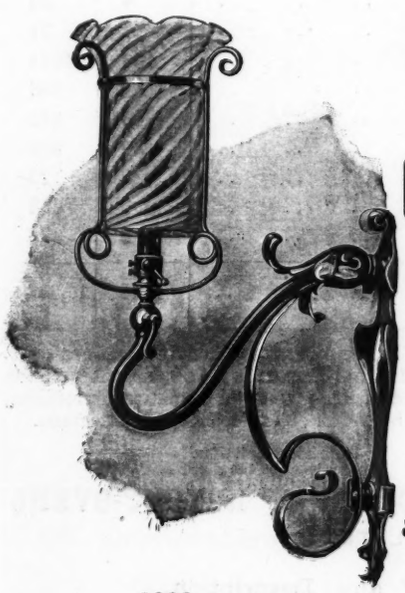

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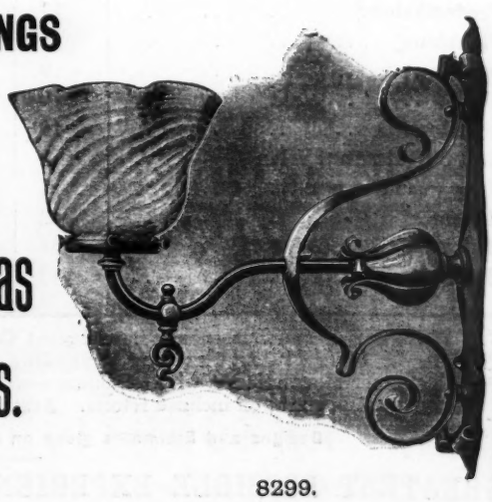

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Berlin V. (Schmargendorf)	20	180	Mannheim	6	54
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Bielefeld	8	72	Muelhausen i. Els.	10	90
Bockenheim, near Frankfort	29	261	Muehlhausen i. Th.	4	36
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Chemnitz	27	243	Odense	9	72
Coblenz	13	117	Randers	4	36
Darmstadt	12	108	Remscheid	3	27
Danzig	20	180	Rostock	6	54
Dresden II.	14	126	Rixdorf	12	108
Dresden III.	10	90	Stettin	21	189
Drontheim	2	18	Stockholm	24	216
Düsseldorf	8	72	Strandvej	4	36
Esslingen	3	27	Trieste	18	162
Elberfeld	5	45	Winterthur	8	72
Frederiksberg	27	233	Witten	4	36
Flensburg	6	54	Wittkowitz	4	31
Gera	9	81	Wien (Vienna)	186	1671
Genf	7	63	Zürich	32	288
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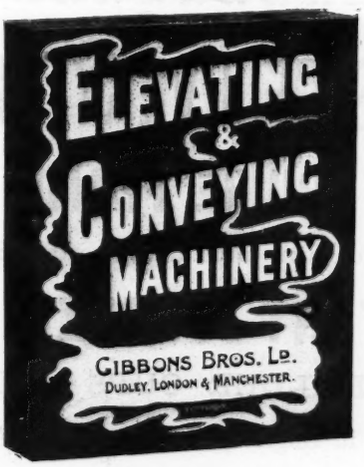

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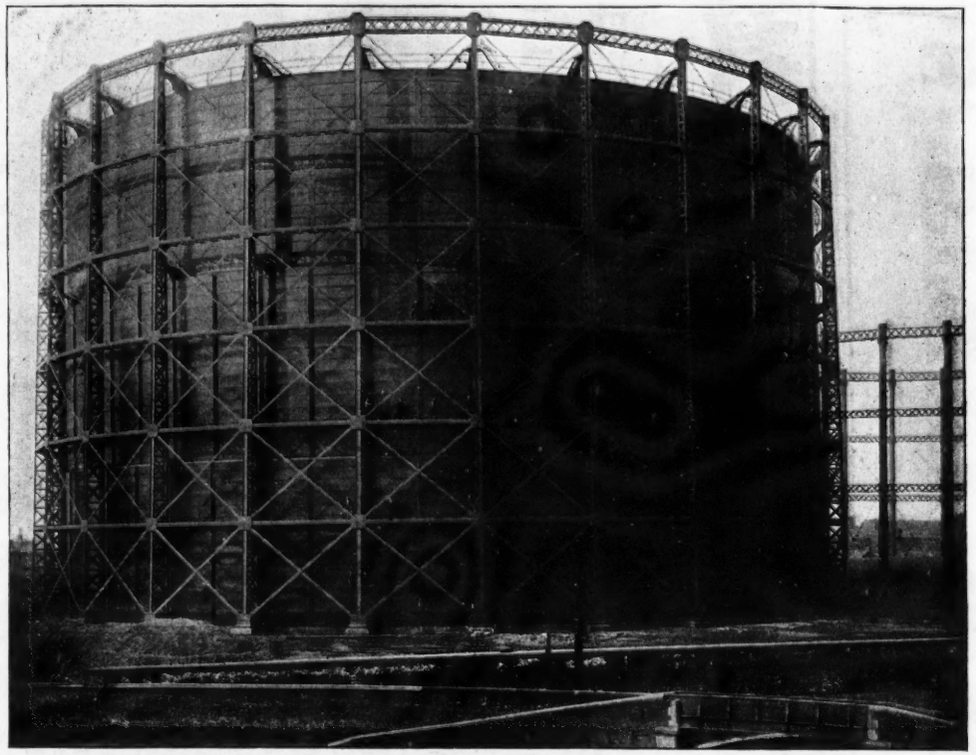

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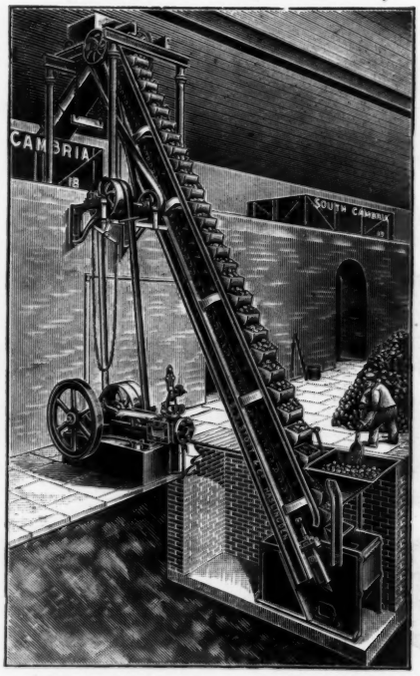

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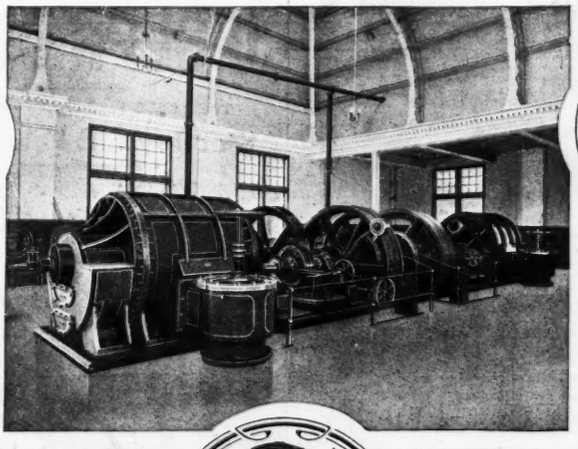

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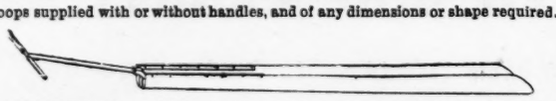

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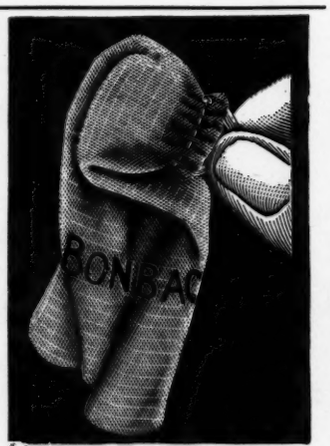

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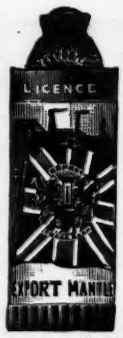

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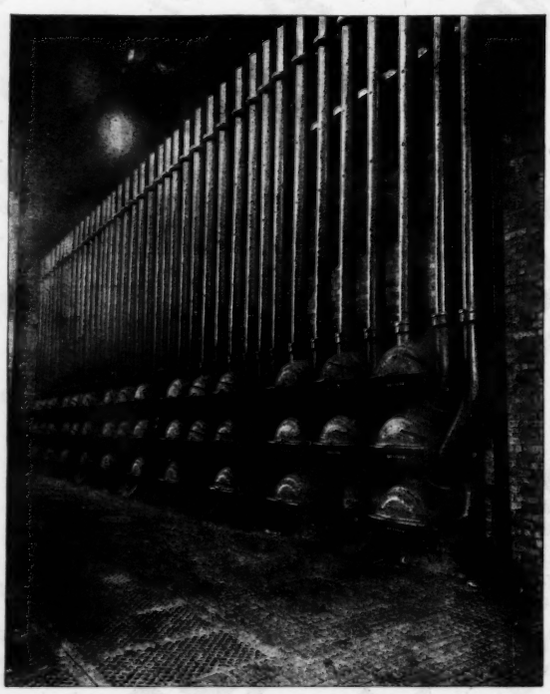

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